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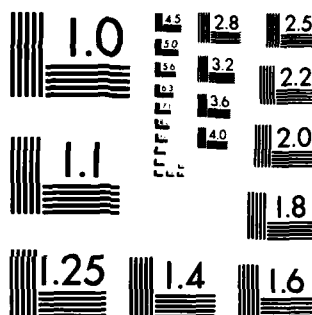
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Strategic Imagination: The Lost Dimension of Strategic Studies.

by

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN NATIONAL SECURITY AFFAIRS

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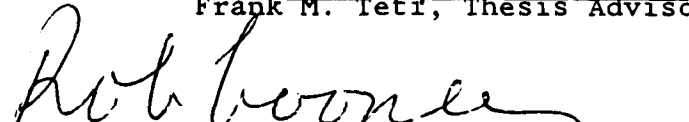
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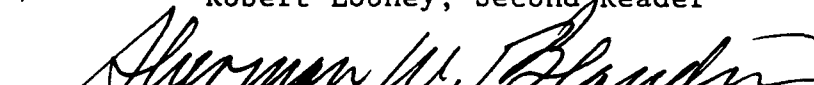
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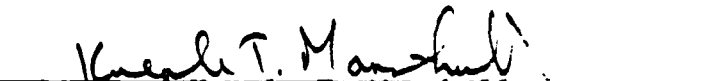

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ABSTRACT

A survey of the range of methodologies from the purely quantitative methods such as systems analysis, operations analysis, and operations research toward methods which incorporate other information, such as trend extrapolation, economic analysis (as it pertains to defense) and the Delphi Technique. A brief introduction to the utility of scenario construction precedes an examination of the wargame; both useful in many ways to the military planner. This is an attempt to illustrate the quality and worth of the quantitative methods, as well as point out the need for the open mind when considering defense matters. Proven methodologies, the scientific method, and alternative courses must all be utilized in the technological war.

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I. INTRODUCTION

A. PROBLEM DEFINITION

For twenty-five years now the United States Department of Defense has been firmly in the grip of the Planning, Programming, Budgeting System, systems analysis, cost-benefit analysis, and the concept of sufficiency. Systems analysis has become confused with strategic analysis. The natural tendency has been to approach all problems as quantifiable ones; attempt to structure the analysis in a numerical manner, and make a decision from the balance sheet. The result is that decisions are not made in relation to a coherent strategy, but rather merely as reactions to individual analysis on an ad-hoc basis.

All of the empirical methods of research are valuable aids to the decision-maker, however, they cannot make the decision for him. The information garnered through research methods must be assimilated into a coherent strategy and at present no reliable mechanism exists for accomplishing that goal.

In the open, pluralistic political system of the United States, administrative changes are frequent. In this type of environment long range policy planning is difficult at best. Defense planning, despite shifts in the civilian leadership, must be geared to a strategy of positive goals and objectives designed to provide for national security into the next century. Ideally, such a strategy would be integrated throughout the services and coordinated with stated national political objectives. It would also be flexible enough to deal with the uncertainties inherent in the budgetary process.

Both the Army and the Navy have commissioned studies of long range strategic planning for the military. The Army study will be addressed in Chapter Three. The Navy experiment, concerned with the shifting trends in the maritime balance, was designed to test the utility of adopting the strategic planning methods of business to naval planning. The concept of a corporate strategy is the pattern of decisions in a company that:¹

1. Both shapes and reveals the company's objectives and goals.
2. Develops the principal policies and plans for fulfilling these purposes.
3. Defines the business the company intends to be in and the kind of economic and human organization it intends to be.
4. Manages the allocation of limited resources to the achievement of limited objectives.

The decisions that contribute to this corporate strategy must be effective over long periods, affect the company in many different ways, and commit a significant portion of the company's resources toward accomplishing the desired purposes. The pattern resulting from a series of such decisions defines the central character and image of the company. In addition, the pattern permits specification of objectives. These are to be obtained through a timed sequence of decisions about investment and execution. The pattern governs directly the deployment or redeployment of resources to make these decisions effective.

Several major problems arise whenever an attempt is made to provide for long term planning needs. First is the problem of uncertainty. Uncertainty exists at all levels of

¹CAPT R.G. Tolg, Jr., USN, et. al., "The Maritime Balance Study. The Navy Strategic Planning Experiment" (Washington, Office of the Chief of Naval Operations, 15 April, 1979) p. 3.

the problem of the future. The environment, resource allocation, potential opponents goals and objectives all must be considered, along with a myriad of other things. Another problem is that of implementation. With planning for the most part dropped out of the Planning, Programming, Budgeting System, long term goals and objectives are unclear at best. Another problem, which relates directly to the adoption of a corporate strategy, is the lack of a measure of utility for resources allocated and options foregone.

B. OBJECTIVES OF STUDY

The backlash of the Vietnam War has been an assault on the rational empirical methodologies under which the Department of Defense has operated since World War II. The problems and pitfalls of these methods were pointed out very dramatically during the mid 1970's when The United States efforts in Southeast Asia collapsed. Since that time a cynical attitude has developed about the quantitative methods. Although they did not provide all the answers as advertised, they still possess an undisputed merit as decision tools. As an attempt to avoid the "throwing out the baby with the bathwater" syndrome, this thesis will examine objectively various methodological techniques, recognizing both strong points and intellectual costs of each. These methodological techniques exist to serve the purposes of forecasting and planning. Therefore, a good starting point is a short examination of these areas, what they do, and what their requirements are. From there the basics of model building and systems analysis will be examined.

The survey of methodologies will be designed to move through the purely quantitative methods such as systems analysis, operations analysis, and operations research toward the methods which incorporate other information, such

as trend extrapolation, economic analysis (as it applies to defense) and the Delphi technique. A brief introduction to the utility of scenario construction precedes an examination of the war game; useful in many ways to the military planner.

Chapter Three is an analysis of scenario construction. Scenario construction in military usage can serve as both a fundamental step to rational empirical analysis and as a bridge to the intuitive, the speculative, and the creative. The next chapter will examine practitioners of scenario building both in defense and in the works of the popular mind. In the defense field, think tanks such as the Rand Corporation, Hudson Institute, and Global 2000 will be addressed. Three short case studies at the policy, strategic, and tactical levels of planning will be presented. Chapter Four will continue with an examination of themes which re-occur in the popular mind; focusing on possible applications to strategic planning. Practitioners who also write in the speculative areas will be presented in order to tie together the practitioners and popular mind sections of the chapter.

The conclusion will attempt to illustrate the quality and worth of the quantitative methods, as well as point out the need for the open mind when considering defense matters. Proven methodologies, the scientific method, and alternative courses must all be utilized in the technological war.

II. SURVEY OF METHODOLOGICAL TECHNIQUES.

A. PLANNING AND FORECASTING

1. Planning

Planning can be broken down into three major categories for the purpose of definitions.

Policy Planning - The formulation of alternative goal patterns or functional objectives for the future - based on alternative future environments or scenarios - in a continuous comparison, selection and feedback process. Policy planning, being concerned with goals, seldom involves technological considerations in any central way.

Strategic (or entrepreneurial) Planning - Formulation of a set of alternative routes or options for achieving the chosen set of goals, together with a procedure for systematic comparison and assessment. The result is sometimes called a decision agenda. Frequently the strategic options involve significant technological developments, especially when the goals are related to physical problems. There may be a large number of ways to achieve any of the functional objectives.

Tactical (or Operational) Planning - delineating the sequence of actions necessary to implement a particular strategy. The technological aspects of tactical planning would be concerned with reaching well defined technological (as opposed to functional) objectives generally in terms of

specified systems or subsystems.²

Planning consists primarily of making current decisions with an eye toward their futurity. It is the process of identifying what must be done in the present in order to enhance the probability of a desired outcome in an uncertain future. A sample of the items which must be considered are:

1. What futurity must be programmed into present thinking?
2. What time spans must be considered?
3. How does one maximize the probability of achieving the objectives sought, while at the same time minimizing risk?

Various methods are available to the planner for assessing the future. A number of these will be addressed in this chapter. Most deal with studies assessing the future comparing goals and the methods and means to achieve them. Capabilities, skills and performance are coupled with timing, funding, resources and facilities structured toward particular goals. Planning examines future alternatives with an eye toward establishing a frame of reference for current decisions. Strategic planning should visualize the system as it is desired to be in the future, identify opportunities and threats, and provide a framework for alternative courses of action.

Planning should begin by identifying the areas of concern, direction and goals. The next step would be definition of strategies, policies and plans to achieve those goals. After the planning phase would come an establishment of an organization or assignment of responsibilities to implement the decisions. Planning, by its very nature, is not a mechanical process. Central to it is the problem of

²Robert Ayres, Technological Forecasting and Long Range Planning (New York, McGraw Hill Book Company, 1969), pp. 162-163.

rational choice and prioritization ranging from the ends desired to the allocation of resources.

2. Forecasting

There are many concepts embraced by the term "forecasting." Forecasting encompasses such ideas as prediction, prophecy, propaganda, and projection. Forecasting can be defined as an attempt to anticipate or predict some future event or condition, usually as the result of rational study and analysis.³ There are four major steps involved in forecasting:⁴

1. Survey the alternatives, anticipate what occurrences are possible and estimate their probabilities.
2. Investigate the interactions among the possible alternative occurrences. Identify the situations over which some control seems possible and estimate the extent of that control.
3. Analyze preferences among the possible alternatives and estimate how varying degrees of intervention can change the associated probabilities.
4. Convert the results of analysis into a display from which the impact of possible actions can be assessed.

Scenario construction and war gaming are useful tools for prediction and projection. Scenario construction can fulfill many objectives when used properly:⁵

1. Stimulate and stretch the imagination.
2. Clarify, define, name, expound, and argue major issues.

³E.S. Ouade, Analysis for Public Decisions (New York, Elsevier, 1975) p. 240.

⁴Ibid. P.242.

⁵Herman Kahn, On Escalation: Metaphors and Scenarios (New York: Frederick A. Praeger, Publishers, 1965) p. viii.

3. Design and study many alternative policy packages and contexts.
4. Improve intellectual communication and cooperation.
5. Furnish specific knowledge, conclusions, recommendations, and suggestions.
6. Clarify current choices, with emphasis on those that retain flexibility for a broad ranges of contingencies.
7. Increase the ability to identify and understand the significance of new patterns and crises.
8. Improve the perspective of decision-makers and increase their ability to react appropriately to the new and unfamiliar.

Scenario construction, simulation and war gaming are useful tools to the military planner, despite some shortcomings. Perhaps one of the most significant advantages of these devices is that they provide an opportunity to make mistakes, and to profit from them. No lives or assets are lost, they are merely in the wings waiting for the next game. It is possible to study the effects of nuclear exchanges, to practice operations in any areas and with weapons of both the present and the future. This is an important method for visualizing and preparing for tomorrow's battles and for developing the organizations and tactics of the future.

B. MODEL BUILDING

At the heart of systems analysis, operations research, operations analysis and most other forms of analysis is the concept of the model. A model is an idealization of the situation appropriate to the problem.⁶ A model is an analog

⁶E.S. Quade, (ed.), Systems Analysis and Policy Planning (New York, Elsevier, 1968) p. 11.

of reality. It is made up of those factors relevant to a particular situation and the relations among them.⁷ A model can be very close to reality. On the other hand, it may not look like the real thing or represent all aspects of reality. The important consideration is whether or not the outputs of the model are reasonably appropriate and valid. It is a means of producing measures of the costs and effectivenesses of various alternatives.⁸

A problem of any complexity can require the use of more than one model. It will often be necessary to have separate models to examine different aspects of a problem. For instance, the anticipated purchase of a new weapons system may require a model of cost considerations, another of performance characteristics, a third of personnel and manpower requirements and a fourth of combat effectiveness. Indeed, part of the job of the modeler is to determine what is important and what is trivial. The analyst may go several times through the cycle of building a model, experimenting with it, deducing its implications, and building a better model.

A model, which may range from a simple war game on a sand table to an elaborate computer program, introduces a precise structure and terminology to the examination of a problem.

The technique itself can be a problem, however, because systems analysis and the entire process of policy planning are faced with uncertainty and alternatives which yield only partially to quantitative reasoning. Sooner or later intuitive judgement becomes necessary. The potential for misuse

⁷R.D. Specht, "The Nature of Models." Systems Analysis and Policy Planning, E.S. Quade, (ed.), (New York, Elsevier, 1968) p.212.

⁸Ibid. p. 213., see also Karl Dersmach, Nerves of Government, (n.p., n.d.) for a discussion of the basic functions of models.

exists if the analyst, armed with model and criterion, believes he can arrive at the optimal course of action to recommend to the decision-maker. The best that can be achieved is the ordering of uncertainty and the presentation of rational alternatives. The model provides a way to produce information about the outcomes that follow a choice of alternatives.

C. SYSTEMS ANALYSIS

According to E.S. Quade, systems analysis involves the planning and design of new systems to perform existing operations better or to implement operations never before performed.⁹ Much of the analysts time is spent determining just what the requirements are and how they can best be achieved. Systems analysis is concerned with the systematic analysis of major policy decisions.

Another definition, offered by Gene Fisher:

Systems analysis may be defined as inquiry to assist decision-makers in choosing preferred future courses of action by systematically examining and reexamining the relevant objectives and the alternative policies or strategies for achieving them; and comparing quantitatively where possible the economic costs, effectiveness(benefits), and the risks of alternatives.¹⁰

Certain elements are common to all analysis problems, although they may not always be explicitly identified by the analyst. These basic elements are:¹¹

⁹E.S. Quade, Systems Analysis and Policy Planning, Op. Cit., p. 9.

¹⁰Gene H. Fisher, Cost Considerations in Systems Analysis (New York, Elsevier, 1971) p. 6.

¹¹E.S. Quade, Analysis for Military Decisions (Chicago, Rand McNally and Company, 1966) p. 155.

1. The objectives - Systems Analysis is undertaken to suggest or help choose a course of action. This action must have an aim or objective. Alternative courses are examined, compared, and preferred on the basis of how well and how cheaply they can accomplish the aim or objective.
2. The alternatives - The alternatives are the means by which the objectives can be obtained. They are not necessarily obvious substitutions or designed to perform the same specific functions.
3. The costs - Each alternative means of accomplishing the objectives implies the use of specific resources which cannot then be used for other purposes.
4. A model or models - As discussed in the previous section.
5. A criterion - A criterion is a rule or test by which one alternative can be chosen in preference to another. It provides a means for using cost and effectiveness to order the alternatives.

Systems analysis, particularly of the type required for military decisions, is still largely a form of art.¹² In the process of analysis, eventually decisions must be made that are thought to be right, but are not verifiable and cannot be justified or checked in the output of the work.

D. OPERATIONS RESEARCH AND OPERATIONS ANALYSIS

Classically, there are three stages in operations research. First, the behavior of the system is carefully described, then the behavior is analyzed by constructing models or theories of operation which are then

¹²E.S. Quade, Analysis For Military Decisions Op. Cit., p. 153.

used to predict the effects on the system if it were changed or modified.¹³

Operational research games are characterized by the use of formal models to assess the effect of players' decisions on the systems' states and to describe, to some degree, player behavior.¹⁴ The development of Operations Research/Systems Analysis tools and the advent of computer technology brought about not only an increased usage of gaming techniques, but also broadened the spectrum of problems and areas which could be addressed. Some examples of this might be high level military assessment problems related to force level planning, armament and disarmament alternatives and arms control. Operations Research gaming theory can also provide a methodological contribution to the problems related to alliances and cooperative defense in regards to armament policies and balanced force structures.

The stated purpose of the Operations Research Society of America is:

The advancement of operations research through exchange of information, the establishment and maintenance of professional standards of competence for work known as operations research, the improvement of the methods and techniques of operations research, and the encouragement and development of students of operations research.¹⁵

Operations research, like other methods of analysis, has both benefits and intellectual costs.

¹³Paul Dickson, Think Tanks (New York, Atheneum, 1972.) p. 22.

¹⁴Reiner K. Huber, Klaus Niemeyer and Hans W. Hofmann, Editors. Operational Research Games for Defense (Munich, R. Oldenburg Verlag, 1979) p. 14

¹⁵David B. Hertz (ed.) Publications in Operations Research Series (New York: John Wiley and Sons, 1972) p. 1127.

The very fact that someone can point out where an analysis has gone wrong, strongly attests to the value of the analytic approach.¹⁶

Some pitfalls of systems and operations analysis must always be taken into account. No method of analysis is perfect; practitioners and users should be aware of the mistakes that can be made:¹⁷

1. Failing to allocate and spend enough of the total time available for a study deciding what the problem really is.
2. Examining an unduly restricted range of alternatives.
3. Trying to do too big a job.
4. Determining objectives and criteria carelessly.
5. Using improper costing concepts.
6. Becoming more interested in the details of the model than in the real world.
7. Forcing a complex problem into an analytically tractable framework by overemphasizing ease of computation.
8. Failing to take proper account of uncertainty.
9. Treating the subject too narrowly - for example, considering only "expected value" or "worst" cases.

However, in recent years, operations research has been employed increasingly as an aid to highly placed decision makers in industry, government, and the military. Operations research attempts to describe, understand and predict the behavior of man-machine systems operating within organizational environments.¹⁸ The application of operations

¹⁶E.S. Quade, Analysis for Public Decisions Op. Cit., p. 300.

¹⁷These pitfalls were first articulated by E.S. Quade in Systems Analysis and Defense Planning. They have since become a classic statement warning of the limits of systems analysis, see Gene Fisher, Cost Considerations in Systems Analysis Op. Cit., p. 16.

¹⁸Ibid. p. 1127.

research to specific problems is a useful, pragmatic technique in areas which lend themselves to quantitative analysis.

E. TREND EXTRAPOLATION

Forecasting by means of projection of trends has been commonly utilized as a method of investigating the future. There are various methods available for analyzing trends in data. The eventual goal of such analysis is the ability to predict future data values based upon empirical evidence. A trend can be defined as a tendency of values in a time series to increase or decrease with regularity.¹⁹ Trend analysis or extrapolation is based upon a comparison of the same statistical population at different times.²⁰ Trends are not cyclic nor are they connected with "seasonality." Some form of formal trend methods in forecasting have been applied to practically every area of futures research. Trend analysis has been used as a methodological or conceptual baseline for more sophisticated methods which are often employed. The analysis of trends is based on the empirical examination of some phenomenon with repeated measurements taken across time. Discovering trends depends upon looking at a large enough time base. Otherwise, non-trend data may lead to false conclusions about the actual trend involved. The availability of time series data on the particular phenomenon of interest is an elementary prerequisite. Trend extrapolation forces a decision on exactly what problem is of concern and on how that problem can be indexed numerically.

¹⁹Hill, Kim Quaile. "Trend Extrapolation." The Procedures of Futures Research. (n.d.) p. 250.

²⁰Jarol B. Manheim and Richard C. Rich, Empirical Political Analysis (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1983) p. 108.

The methodology of assembling statistical time-series to plot trend lines and extrapolate likely developments is not infallible. The existence of a trend is not a guarantee that it will continue. Knowledge of trends, however, grants more knowledge of likely developments. The construction of a model is a combination of trend extrapolation and likely developments designed to uncover connections and causal relations between variables.²¹

The utility of trend analysis is its ability to be predictive, albeit with a limited degree of success. The analysis of trends, however, does not generally provide the researcher with information about causality. Regression methods, when used for prediction, tend to yield answers which are probabilistic rather than deterministic. The merits of trend analysis include:

1. Relative ease and economy of utilization.
2. Can be used often since trends abound.
3. A good starting point for further analysis.
4. Forces the researcher to learn about the subject.
5. Forces the researcher to employ other methods in the quest for causality.

Trend analysis is a good baseline in the context of its use in conjunction with other techniques. Its use alone cannot significantly advance rigorous forecasting and causal analysis. It is a method for exploring and refining many forecasting problems and as a "first cut" approach to defining the boundaries of the issue.²²

²¹Herman Kahn and Anthony J. Wiener, The Year 2000 (New York: The MacMillan Company, 1967) p. xxviii.

²²Kim Quaile Hill, "Trend Extrapolation" Op. Cit., p. 251.

F. ECONOMIC ANALYSIS

Any analysis must be conducted within certain "ground rules".²³ These are a set of propositions which are taken as useful and acceptable simplifications for the sake of argument. First is the principle of cost benefit analysis. Policy ought to be determined by systematic comparisons of costs and benefits rather than by intuition or by the interplay of political pressure groups. The second principle is the efficiency criterion. Costs and benefits should be calculated in terms of overall achievement, as expressed in the value of goods and services produced or foregone.

The essence of economic choice in military planning is not quantitative analysis: Calculation may or may not be necessary or useful, depending upon the problem and what is known about it. The essential thing is the comparison of all the relevant alternatives from the point of view of the objectives each can accomplish and the costs which it involves; and the selection of the best (or a "good") alternative through the use of appropriate economic criteria.²⁴

The elements of a military problem of economic choice are similar to the elements of systems analysis as discussed earlier. They are the objectives, alternatives, costs, models, and criteria. However, economic choice is a way of looking at problems and does not necessarily depend upon the use of analytical aids or computational devices.²⁵ Some analytical tools such as mathematical models are useful in analyzing complex problems, but there are many military problems where they have not proven particularly useful.

²³Jack Hirshleifer and David L. Shapiro "The Treatment of Risk and Uncertainty" Public Expenditures and Policy Analysis Robert H. Haveman. (ed.) (Chicago: Markham Publishing Company, 1979) p. 291.

²⁴Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age (New York, N.Y.: Atheneum, 1978) p. 118.

²⁵Ibid. p. 120.

G. DEFENSE EFFORT

Forecasting, planning, education and gaming have long been areas of concern to the United States defense establishment. The forecasting and planning efforts attempt to identify what the future role, mission, and goals of the military might be, as well as to identify potential adversaries in possible conflicts. Education and training serve to ready the forces to fulfill their mission in an efficient, timely manner. The game is the rehearsal for the mission.

The defense effort should be approached as a decision process geared to the concept of the "technological war". Its government should be according to a strategy, rather than by a series of independent technological or scientific decisions.

Technological warfare is the direct and purposeful application of the national technological base and of specific advances generated by that base to attain strategic and tactical objectives.²⁶

In The Strategy of Technology Possony and Pournelle advocate the concept of a core structure to achieve this aim. Some of the important elements affecting strategic analysis are:

1. Government support in providing the resources, setting the grand strategy of the nation, and in justifying expenditures and courses of action to the public.
2. Technology to provide strategic analysis with new possibilities, develop specific systems from military requirements, create technology on demand, conduct pure research and discover new fields of technology.

²⁶Jerry Pournelle and David Possony, The Strategy of Technology (new York, Atheneum, 1978) p. 63.

3. Development of the military arts to provide contingency plans based upon an appreciation of capabilities and limitations of all parties involved in a potential future conflict.
4. Nonmilitary conflict experts; to provide the elements of diplomacy, foreign aid, economic warfare, and propaganda and psychological warfare to be coordinated into the overall strategy.

In the defense systems analysis environment there is no simple operational criterion of effectiveness that has the role of profit or utility maximization in economic theory.²⁷ As a result, a suboptimization framework is utilized which fixes either a budget or level of effectiveness. In the fixed budget approach, a specific cost level is used in the attainment of a given objective. The analysis attempts to determine the alternative, or combination of alternatives likely to produce the highest effectiveness. The fixed effectiveness approach, on the other hand, specifies a level of effectiveness to be attained in the accomplishment of a given objective. The analysis attempts to determine the alternative or combination of alternatives likely to achieve the specified level of effectiveness at the lowest economic cost.²⁸

H. DELPHI TECHNIQUES

The Delphi Technique is a method of eliciting and refining group judgments.²⁹ It is a very early example of

²⁷Gene Fisher, Cost Considerations in Systems Analysis Op. Cit., p. 11.

²⁸Ibid. p. 10.

²⁹Norman Dackley, "An Experimental Study of Group Opinion. The Delphi Method," Futures, September, 1969., vol. 1., no. 5., p. 408. For additional background in the development of the Delphi Technique see also: Bernice B. Brown, O. Helmer, and H.C. Dackley, The Delphi Method, II: Structure of Experiments (Santa Monica, The Rand

formalized, intuitive methods of research. The technique is of direct relevance for the use of experts as advisors in decision-making, especially in areas of broad or long-range policy formulation. It is useful for the systematic solicitation and collation of informed judgments on a particular topic.³⁰ The possible objectives of a Delphi can include:³¹

1. To determine or develop a range of possible alternatives.
2. To explore or expose underlying assumptions or information leading to differing judgements.
3. To seek out information which may generate a consensus of judgement on the part of the respondent group.
4. To correlate informed judgements on a topic spanning a wide range of disciplines.
5. To educate the respondent group as to the diverse and interrelated aspects of a topic.

The Delphi Technique was developed by the Rand Corporation in the 1950s. The procedure was designed to obtain the most reliable consensus of opinion of a group of experts through a series of questionnaires interspersed with a series of controlled opinion feedback.³² The Delphi Technique method has as its key elements:

Corporation, June, 1969), N.C. Dackley and O. Helmer, An Experimental Application of the Delphi Method of the Use of Experts (Santa Monica, The Rand Corporation, July, 1962), N.C. Dackley, Delphi (Santa Monica, The Rand Corporation, October, 1967), Bernice B. Brown, Delphi Process: A Methodology Used for the Elicitation of Opinion Experts (Santa Monica, The Rand Corporation, September, 1968), O. Helmer, and N. Rescher, On the Epistemology of the Inexact Sciences (Santa Monica, The Rand Corporation, February, 1959).

³⁰Murray Turoff, "The Design of a Policy Delphi," Technological Forecasting and Social Change. vol. 2., no. 2., 1970.

³¹Ibid.

³²Harold A. Linstone, "The Delphi Technique." The Procedures of Futures Research March, 1976.

1. structuring of information flow.
2. feedback to the participants.
3. anonymity for the participants.

The method involves the following ten steps:³³

1. Formation of a team to undertake and monitor a Delphi on a given subject.
2. Selection of one or more panels to participate in the exercise. Customarily, the panelists are experts in the area to be investigated.
3. Development of the first round Delphi questionnaire.
4. Testing of the questionnaire for proper wording.
5. Transmission of the first questionnaires to the panelists.
6. Analysis of the first round responses.
7. Preparation of the second round questionnaires.
8. Transmission of the second round questionnaires to the panelists.
9. Analysis of the second round responses. Steps seven and nine are reiterated as long as necessary to achieve stability in results.
10. Preparation of a report by the analysis team to present the conclusions of the exercise.

The Delphi Technique is a simple method which seeks to impose some controls by checking the informed guesses of one set of observers with those of another. It is a synergistic exercise made possible by the retention of anonymity.

I. CENTRALITY OF SCENARIO BUILDING

The 'scenario', an important element of most models, simulations, or games delineates the modeler's concept of whatever he is attempting to represent. The political-military scenario is the mechanism which provides a context for considering defense decisions, contingency plans, and provides the background against which war games may be played.

³³Harold A. Linstone, "The Delphi Technique" Op. Cit.

Studies of the future are not efforts to predict per se, but rather an effort to sketch "alternative futures" - in other words, the likely results of different choices, so that the polity can understand the costs and consequences of different desires.³⁴ A scenario is a time ordered, episodic sequence of events bearing a logical (cause-effect) relationship to one another and designed to illumine a hypothetical future situation. A scenario is not and is not intended to be either a prediction or forecast.³⁵ Scenario building can be approached as an effort to examine the total costs of alternative plans. The heart of future studies, whether of domestic or international affairs, or both, is the effort to chart alternatives as the condition for policy choices.

The term 'scenario' is most often used to describe the political-military events leading up to a crisis, as well as the crisis itself.³⁶ It may serve many other purposes in the construction of a war game.³⁷

1. It may be used as a general background for defense policy considerations.
2. It may be designed to provide the opening, setting, or sequence of events in a war game.
3. The scenario may be utilized to provide an environment in which to examine the functioning of specific weapons systems, or entire strategies.
4. More dangerous and less ethical, a scenario may be designed to make a weapon system or strategy more attractive in a particular environment.

³⁴Herman Kahn and Anthony J. Wiener, The Year 2000 Op. Cit., p. xxvi.

³⁵Robert U. Ayres. Technological Forecasting and Long-Range Planning Op. Cit., p. xiv.

³⁶H.A. DeWeerd, Political-Military Scenarios (Santa Monica. Rand Corporation. February, 1967) p. 14.

³⁷Ibid. p. 11.

5. A scenario may be designed for contingency planning.

In addition, it may serve a heuristic function, reduce the externality problem, and serve to expose alternatives not obvious through analysis. The term scenario can also be applied to:³⁸

1. An outline of a sequence of hypothetical events.
2. A record of the actions and counteractions taken by parties to a conflict.
3. A plan of action to be taken during a projected exercise or maneuver.
4. The estimate of the situation by Commander "X" at time "Y" in a war or war game.
5. A specific set of parametric values selected for a given run of the computer.

A defense political military scenario can take many forms. It may be extremely brief or as long as a book. It may be a faithful representation of reality or may be a fantasy depending entirely upon the purpose of its design. The scenario can cover literally any level of detail in the political-military spectrum. The design can be for attrition modelling, movement in tactical games, decision modelling for large scale global conflicts, insurgency operations, or anywhere in between.

In 1960, Secretary of Defense Robert S. McNamara adopted the procedure of introducing his defense programs to Congress by offering an elaborate description or scenario of the world situation, against which congressmen were asked to consider his proposals.³⁹ As his tenure in office progressed, McNamara continued to use scenarios as a means of determining the advantages of alternative force postures

³⁸Seyom Brown, "Scenarios in Systems Analysis." Systems Analysis and Policy Planning E.S. Quade (ed.), Op. Cit., p. 299.

³⁹H.A. DeWeerd, Political-Military Scenarios. (Santa Monica: The Rand Corporation. February, 1959) p. 4.

in relation to specific contingencies. He did not rely upon cost-effectiveness calculations alone to determine force structure; he also employed sophisticated analysis of potential political-military conflicts.

J. WAR GAMING

Wargaming is a tool to analyze large complex situations, forecast the future, and to produce synthetic statistics relating to real life situations where no statistics could be produced otherwise. The results of any war game must be examined carefully and used with caution. Nonetheless, war gaming is useful in many ways:⁴⁰

1. To aid training.
2. To test war plans.
3. To organize and analyze large groups of data.
4. To force decisions to be made and to permit specific, concrete interactions among factors.
5. To check the credibility of decisions.

War gaming possesses the inherent advantages of simulation, and provides a methodology for studying and examining almost any scale or type of conflict. Gaming provides a means of gaining useful experience and information in advance of an actual commitment, of experimenting with forces and situations that are too remote, too costly, or too complicated to mobilize and manipulate, and of exploring and shaping the organizations and systems of the future.⁴¹ When, as in nuclear warfare, there are no precedents, no historical examples to furnish guidelines, war gaming can create its own history of artificial wars.

⁴⁰M.G. Weiner, War Gaming Methodology (Santa Monica: The Rand Corporation. July 1959) p. 21.

⁴¹Francis J. McHugh, Fundamentals of War Gaming (Newport, R.I.: The United States Naval War College, 1966) p. 1-25.

It is important as well to note what war gaming will not do:⁴²

1. Provide the decision-maker with a predictive, operational tool.
2. Make allowances for idiosyncratic characteristics of decisionmakers.
3. Explicitly provide a measure for determining reality.

Political-military games, due to these considerations, are somewhat limited in their ability to test strategies or forecast political developments with any real degree of confidence. This does not, however, negate the worth of the war game. It merely re-emphasizes the importance of basing the scenario upon accurate assumptions and conceptualizations.

1. A Very Brief History

War games grew out of military chess which in turn evolved from the ancient game of chess. The main objective of both chess and military chess seems to have been to furnish amusement. If one accepts such games as chess as a form of war game, then the art of wargaming does go back to the beginning of recorded history. However, as chess was not recognized as a military training aid until sometime in the eighteenth century, it cannot be included as a scientific tool.

In the later part of the eighteenth century an attempt was made to treat warfare as an exact science. This was the first recorded use of war games as an aid to scientific analysis of war situations. Great emphasis was placed on mathematical theories and the scientific method became an end in itself rather than the battle. In Germany a game was developed called "The New Kriegsspiel." The military men of

⁴²Peter DeLeon, Scenario Designs: An Overview (Santa Monica: The Rand Corporation. June, 1973) p. 5.

the day became intoxicated with the model. Eventually they had a difficult time in distinguishing the model from reality. The "science" of wargaming suffered a setback as Napoleon overran Europe, since he refused to fight the way the model said he should.

In 1811, the wargame was transferred from the chess board to a sandtable. The terrain was modelled in sand with blocks of wood representing the military forces. Somewhat later an improved model substituted plaster and included woods, trees, villages, rivers, etc. Further modifications were made in the next generation including the use of a map instead of a sandtable, and a written set of rules for the playing of the game.

Kaiser Wilhelm II ordered the game to be adopted by the German army. As time progressed, more elaborate rules for the conduct of the game were written, intricate calculations became involved, and umpires were needed to govern the play. Improvements were made in the details of terrain and statistics were gathered from past wars. The eventual result was a game called Rigid Kriegsspiel.

A reaction to this type of gaming eventually set in resulting in a different concept called Free Kriegsspiel. In the Free Kriegsspiel an attempt was made to do away with the rules and depend upon the judgement of the game director for decisions affecting the play of the game. Free Kriegsspiel continued as a training aid of the German military and general staff until at least World War II.⁴³

⁴³Further information on the subject of the history of war gaming can be found in an address by Arthur W. Pennington on the history and classification of war gaming presented to the First War Gaming Symposium, 30 November, 1961. John Overholt, (ed.) First War Gaming Symposium Proceedings (Washington, D.C. Washington Operations Research Council, 1961)

2. Wargaming Past Battles

Sandtable war gaming lends itself readily to the reconstruction of historical battles.⁴⁴ Care must be taken to ensure accuracy. Every aspect of the battle has to be considered in its correct context, and in correct chronological order. To refight any historical battle realistically, care must be taken when constructing the terrain on the sandtable, and the forces must represent the actual numbers and technology available at the original battle. Another alternative is to allow a modest leeway in command style and chronological events, allowing for an other than historic outcome.

This style wargaming lacks any utility for forecasting, but can be valuable as the wargamer may gain an insight and understanding of the problems of the commanders in the field and a glimpse of the military thinking of the time.

3. Manual War Games

Manually played games may be used for training and for investigations of tactics, strategies, or comparisons of equipment. They are occasionally useful for prediction and forecasting as well. A manual war game is defined as a simulation of a real life situation conducted by any means whatever where opposing forces are represented actively and all decisions are man made.⁴⁵

Because of its flexibility and low equipment cost, it is a useful technique, particularly of the simulation of ground combat. A manual war game is characterized by two

⁴⁴An introduction to this style wargaming may be found in Donald Featherstone, Battle Notes for Wargamers (New York: Drake Publishing, Inc. 1974)

⁴⁵J.B. Phillips, "Manual War Gaming" First War Gaming Symposium Proceedings Op. Cit., p. 7.

opposing teams with some sort of umpire or control section. In order to establish a manual game several criteria must be met:⁴⁶

1. The objectives of the game must be defined.
2. The scenario must be credible and relevant to the objectives.
3. The selection of the players and control personnel must support the objectives.
4. The area and time scale must be established.
5. Procedures for the collection and evaluation of data must be established.

In this type of game the forces are represented by models, pieces, pins, or symbols. The participants move them about by hand on a board, map, chart, or terrain model which depicts the area of operations.⁴⁷ Contacts and interactions between forces are evaluated in accordance with the professional judgement of the umpires, or with the aid of rules, measuring devices, graphs, or formulas.

4. Machine Games

A machine game is considered to be a game conducted on equipment or systems designed and constructed for the express purpose of gaming. Machine gaming systems provide electromechanical or electronic aids for the movement and display of forces, the simulation of sensors and communications systems, and umpire bookkeeping and evaluation.⁴⁸ These are electromechanical or electronic versions of manual games. This type war game is utilized across a broad spectrum of training and simulation. In what is perhaps its most useful mode, machine games are used as training devices

⁴⁶Ibid. p. 8.

⁴⁷Francis J. McHugh. Fundamentals of War Gaming Op. Cit., p. 1-21.

⁴⁸Ibid. p. 1-21.

for military personnel from junior enlisted to flag officers. Examples of this style game are the Naval Electronic Warfare Training System in Newport, the Anti Air Warfare trainer in Dam Neck, Va., and the Anti Submarine Warfare trainer in Norfolk.

5. Computer Assisted Games

The advent of computers opened many new possibilities for scenario construction and wargaming. In this type of game the tactics of both sides are reduced to a computer program which will compute the outcome of a battle when all relevant data, such as weapons and sensor system parameters are injected into the program. An inherent, major problem which comes immediately to mind is that of constructing an adequate data base. It is not a trivial task to attempt to include a significant amount of data which is relevant to the game. Each and every situation thought to be important must be included in the program and a suitable response to the situation programmed.

Another problem which arises quite frequently once the game or simulation has started is that of real time versus computer time inputs. Information which is fed to the players of the game verbally must be orchestrated closely with the information which they receive via the computer program. If the two information sources are allowed to run out of synch, the results can be mass confusion, and invalidated results of the game.

Simulation is the representation of a system or organism by another system or model designed to have a relevant behavioral similarity to the original. All games are simulations, but not all simulations are games. An example of a simulation which is not a game would be a model designed to study an inventory or logistics control system or problem.

Computer simulation is an analytical technique using mathematical or logical models to study the behavior of actual or hypothetical events, processes, or systems over extended periods of time.⁴⁹ It is a means of gaining experience and of making and correcting errors without incurring the risks or costs of actual application.

⁴⁹Garry D. Brewer and Martin Shubik, The War Game. A Critique of Military Problem Solving (Cambridge, Mass: Harvard University Press, 1979) p. 9.

III. COMPOSITION OF SCENARIOS

There is no universal rule for scenario writers which tells one what to include and what to omit. Neither is there a universal form in which they should be presented. They vary greatly according to the use to be made of them.⁵⁰

A. THE PLANNER

The study of the art of war encompasses much more than mere training in the empirical mastery of a warfare specialty. Understanding why men fight is at least as important as knowing how in the technological age. The technological knowledge required of the modern military officer conceals a serious trap. It has become all too easy to get wrapped up in the day to day nuts and bolts and neglect education in strategy and tactics. This is especially true for several reasons. First, the sheer volume of technical knowledge necessary to carry out the mission dilutes the amount of time available to a member of a military system which does not employ a general staff organization. Another problem which has arisen over the years is linked to the increasing technological sophistication of the systems as well. The political system which exists within the military puts a premium on those officers who understand the operation of the systems rather than those who

⁵⁰ Rosenau, James, "Pre-theories and theories of Foreign Policy" Approaches to Comparative and International Politics R. Barry Farrell, (ed.) (Chicago: Northwestern University Press. 1966)

understand the principles of their utilization. The study of Jomini, Clausewitz, Schlieffen, and Moltke has gone out of fashion in the training of the American military officer corps. This is particularly unfortunate in that it appears not to be the case among the officer corps of our worst-case potential adversaries, the Soviet Union.

In the years since World War II, the United States has become increasingly status-quo oriented. The origins of this attitude can be found in the policy of containment, which was the first acknowledgement that the Soviet Union was our next potential adversary.

George Kennan, onetime American ambassador to Moscow, and by reputation the foremost Soviet expert in the government, in 1947 published his Mr. X article in Foreign Affairs. With this he became the mastermind of the strategy of containment.⁵¹ His intent was to suggest the political containment of a political threat posed against the west by Russia under Stalin. As containment evolved, it was transformed into an intention to oppose by military means a presumed Soviet determination to dominate the world by military force. The United States, from a position of wealth and power never before achieved by any nation, embarked on a foreign policy that substituted improvisation for invention and reaction for action. Out of fear of another people's ideology, the ideology of America suffered a deep change. Containment, carried to extremes, became a paranoia which prevented America from recognizing that she had slipped into a national policy which merely reacted to the moves of the Soviet Union. The United States became a nation without objectives, without national goals, beyond that of "containing" the expansion of the Soviet Empire.

⁵¹ James A. Nathan and James K. Oliver. United States Foreign Policy and World Order (Boston, Little, Brown and Company, 1981) p. 74.

Containment, as it was originally conceived, would have been a positive, offensive force. It would have worked actively toward the lessening of the Soviet Union's political and ideological influence not only in the international realm, but also within the borders of Russia itself. It would have encompassed an effort to break the grip of tyranny on Eastern Europe while at the same time demonstrating to the world that the forces of freedom were alive, capitalism worked, and that Marxism-Leninism did not have the scientific answers to history which it claimed.

The military planner must fight against this recent heritage of status-quo orientation. The understanding of technology, political objectives, and the theory of military strategy are all important. It is all well and good for the nation as a whole to be oriented towards the maintenance of the status-quo, but the military at least must realize that the enemy is expansionist, and without a theory of victory we are lost.

Military planning since the inception of containment has been carried out in the absence of a clearly enunciated United States national strategy. The common methods employed for short range planning consist of identifying a set of fixed interests, juxtaposing them on a fixed environment, and then creating a strategy for attaining these interests within the constraints of that environment.⁵² This approach is useful for short range planning, but fails to take into account the problem of uncertainty, which cripples it for long range use. The problem of uncertainty of interests can be dealt with by defining them at a sufficiently high level of generality. The problem of uncertainty in the environment must be approached from a different tack. The

⁵²Richard J. Glikes, "An Approach to Long-Range Strategic Planning." (Carlisle Barracks, Pennsylvania. United States Army War College, Strategic Studies Institute, 1978) p. 1.

future environment can be projected as a series of alternatives, few enough to manage, but sufficient to cover the likely important alternative trends.⁵³ From this can be devised a series of strategies to be called into play as necessary.

Several problems arise with this approach. Multiple strategies can be contradictory to one another. It also disregards the influence of the planner's own short and medium term decisions over the evolution of the environment. The United States, as well as other countries has sufficient power to affect the evolution of the environment.

1. The Ad Hoc Process

The real planning - that affecting long term needs, types and quantities of forces and providing foresight into the future - is done by upper echelon leaders on a personal, ad hoc basis.⁵⁴

A good case can be made that the actual process of planning and decision-making bears a strong resemblance to Lindblom's "science of muddling through."⁵⁵ Lindblom believes that the theory on decision-making differs greatly from what actually occurs.

Policy planning which attempts to take into account all theory, data, values, and alternatives is unrealistic and too unwieldy for day to day applications toward complex problems. To its credit, this method yields clarity of objectives, explicitness of evaluation and a high degree of comprehensiveness of overview. The planners/decision-makers must start from fundamentals anew each time, building on the

⁵³Ibid. p. 1.

⁵⁴Gerald G. O'Rourke, "Great Operators, Good Administrators, Lousy Planners," United States Naval Institute Proceedings August, 1984, p. 75.

⁵⁵Charles E. Lindblom, "The Science of Muddling Through" Public Administration Review, June 1959. p. 44.

past theories and value systems, and always be prepared to start completely from the ground up.

The means by which planning takes place is much more an ad hoc process in a problematic context. Planning and decision-making continually build out from the current situation, step by step, and in small degrees. The planner sets as his principle objective a relatively simple goal, disregarding many alternatives, consequences, and values which would have to be examined in a more academic setting. The practitioners expect to achieve their goals only partially, they expect to have to repeat the process endlessly, as conditions and aspirations change and as accuracy of prediction improves. The test of a good policy is agreement on the policy itself, not whether it achieves a particular set of objectives.

At the lower levels of policy planning, many inputs; underlying values, as well as collected data and historical perspective, are considered. Both long and short term; goals, objectives, and possible effects are examined. As the problem passes up the chain of command, the aspects to be considered are trimmed down until finally the ultimate decision-maker makes the policy choice. The information he receives is the basic problem pared down to a yes or no, go or no go format. Although many alternatives and much information have been considered enroute, the actual decision is made in this manner. In this context, the short term frequently triumphs over the long term.

2. Legitimacy

Another aspect of strategic planning worthy of note is the concept of legitimacy. This concept in many ways cuts across the "realist versus idealist" problems of decision-making, and does much to undermine the position of the "pure" realist or pragmatist. Proponents of the

pragmatic approach to decision-making simply cannot completely disregard the American culture and context within which they operate. Success is an important factor towards the legitimization of any bureaucratic decision-making. However, a plan or policy which did not take into account the basic American value system, no matter how successful, would not be judged to be legitimate in the eyes of the American people. Indeed, the juxtaposition of pragmatic interests and basic values underlines the difficulty of the legitimization process in the American political and military culture.⁵⁶

B. CRITICAL CONSIDERATIONS

1. Purpose

The preponderance of Americans, for at least the last several decades, have exhibited an unwillingness to acknowledge unpleasant realities. They seem to want to believe only that which does not interfere with their own personal tranquility. As an example, many people in this country do not realize that NORAD is an empty shell, and that the United States would be hard pressed to detect an incursion of its air space, much less respond in a coordinated, effective manner.

This trend of unwillingness to see reality seems to be shifting slowly, but in the meantime the military planners must continue to create unpleasant scenarios in order to formulate possible courses of action. Inadequacy of knowledge frustrates prediction and hampers successful programming, especially in a world characterized by technological change and by broad opportunities for individual

⁵⁶Frank M. Teti. "The Public Interest: In Search of an Operational Definition.", (Prepared for the American Society of Public Administration, n.p., n.d.) p. 27.

decision-making.⁵⁷

The utility of forecasting is greatly increased by the use of a number of scenarios examining a number of courses and responses. This is true whether the purpose of the scenario construction is for wargaming or merely as a heuristic exercise.

The purpose of all war games is pure or applied research. Pure research, in the military sphere, is defined as an attempt to gain a fuller understanding of political and military interactions.⁵⁸ Applied research ranges from data collection to the assessment of alternative strategies and the identification of indicators by which to judge the results of current operations.

In a broader sense, the purpose of each individual game is tailored to produce the desired results. For instance, if the purpose of the game or simulation is to offer policy recommendations or implications, then the scenario acquires a dominant role. Without a set of accurate and relevant assumptions and predictions in the scenario, the policy purposes would not be recognized and the game results would be worthless.

2. Credibility

Any scenario designed for military research and analysis, or for the opening of a war game, should be made as credible as possible. The scenario should strive for a high degree of consistency both within the scenario itself and as close as possible a resemblance to the real world.

⁵⁷Irving, H. Siegel, "Technological Change and Long Run Forecasting," The Journal of Business of the University of Chicago, July, 1953, p. 146.

⁵⁸Wilson, Andrew. The Bomb and the Computer. (New York, Delacorte Press, 1968) p. 158.

Game credibility is extremely difficult to achieve in a scenario which is placed in a future oriented time setting. For this type of game, credibility does not retain the level of importance which it has in a more operationally oriented case.

Critics of the credibility of scenarios must recognize that a scenario is not prepared for the purpose of predicting single future events. In an attempt to predict single future events, one mistake invalidates the results. In a well constructed scenario, the weakness of a single event is compensated for by the credibility of the remainder.

3. Relevance

In some cases the research objectives, or defense objectives must take precedence over credibility in the design of a scenario. The designer must recognize when a research project or war game is being carried out to examine an otherwise obscure problem, and not to achieve complete identity with the real world.⁵⁹ In these cases relevancy takes precedence over credibility.

Relevance also relates to the issue of validity.⁶⁰ Since the scenario is often a representation of reality, it is desirable to examine whether the analytical procedure used is a reasonably good representation, within the context of the problem at hand. In order to accomplish this, several questions might be asked:⁶¹

⁵⁹H.A. DeWeerd, Political-Military Scenarios
Op. Cit., p. 11.

⁶⁰Gene Fisher, Cost Considerations in Systems Analysis
Op. Cit., p. 14.

⁶¹Ibid. p. 15.

1. Can the model or scenario describe known facts and situations reasonably well?
2. When the principal parameters involved are varied, do the results remain consistent and plausible?
3. Can it handle special cases where an indication of the probable outcome is known?
4. Can it assign or identify causes to known effects?

4. Plausibility

The assumptions upon which the scenario rests are vitally important for many reasons. If not grounded in reality, the user is forced to suspend belief and the results could suffer. At times, however, it becomes necessary to stretch the imaginations of the participants in order to serve the objectives of the exercise. An example of this might be a scenario designed to forecast or examine post nuclear war recovery phases in society and government. A careful balance of credibility, relevance and plausibility would be necessary in order to achieve useful results.

Almost all scenario construction must operate under the constraints of incomplete or incorrect information. Information which is unavailable or restricted access such as actual nuclear targeting doctrine, decision-making criteria within the governmental organizations of foreign powers are obstacles which must be overcome within the scenario. Careful attention to detail, along with best-guess estimates, are vital to the scenario retaining not only its plausibility, but also its utility.

C. CONSTRUCTION

1. Time Setting

The time setting is an important parameter. The setting can not be so near at hand that current events can

intrude into the game nor can it be so far ahead in time that it outruns the capacity of the players to conceive of a consistent future.⁶² The further into the future the game is set, the more artificial background material must be not only provided by the scenario writer but also assimilated by the players. In most cases, the ideal approach is to provide a background just sufficiently removed from real time that current events will not interfere, but close enough to make the setting plausible in accordance with what the players understand of the real world.

Another consideration is the lead time necessary for the sponsors of the game to implement useful findings.⁶³ A time setting too close to the present would not allow an opportunity to implement useful findings. On the other hand, a setting too far in the future might not command the attention necessary to drive implementation of changes based on the findings.

2. Environment

An obvious consideration must be the environment. The more closely the initial construction of the scenario resembles reality, the more plausible it will be. However, changing the environment by removing it from immediate political reality, can conceivably lead to the discovery of entirely new problems and insights and provide a greater emphasis on analytical results or generalizations.⁶⁴ For example, the character of the study would be greatly modified by a scenario in which NATO had been dissolved, Mexico was in revolution, various nation-states in addition to the

⁶²Peter DeLeon, Scenario Designs: An Overview Op. Cit., p. 11.

⁶³Ibid. p. 11.

⁶⁴Herbert Goldhamer and Hans Speier, Some Observations on Political Gaming (Santa Monica: The Rand Corporation, 1959) p. 22.

present nuclear powers were in possession of nuclear weapons or if internal strife in the Soviet Union caused increased international tensions.

A number of variants could be explored in which the scope of the scenario is changed so as to encompass smaller or larger political-geographical areas or more or less specialized policy problems.⁶⁵

3. Level of Detail

The level of detail required in scenario construction is subject to a number of variables. The one which comes most readily to mind is the purpose of the game. If it is desired to test battle group tactics, then the level of detail must be sufficient to take into account the parameters to be examined. Political considerations can be ignored, as it would not be important to determine why the battle started in the first place. If, on the other hand, the desire is to model possible reactions of world leaders to a given policy or course of action, the level of detail required would be much greater, albeit in a different direction.

The level of detail and complexity of a scenario must take into account the level of expertise of the players. If the scenario is designed for the use of battle-group commanders, it will be of little utility for the training of cabinet level politicians.

In the early days of American nuclear superiority over the Soviet Union, the opening scenario for a general war game conducted in the United States could be extremely brief and simple.⁶⁶ It often said that at a given time, usually by surprise, the Soviet Union launched an airborne

⁶⁵Ibid. p. 24.

⁶⁶H.A. DeWeerd, Political-Military Scenarios Op. Cit., p. 3.

nuclear strike against the continental United States. No background data as to reasons for the attack, or political considerations, were given. The simplicity of these scenarios was accepted at the time on the grounds that what was important was the American nuclear superiority, not the political details relating to the situation under which the attack was made.⁶⁷ The Strategic Air Command and the Soviet Air Forces were the only factors which really mattered. Alliances, the United Nations, and the uncommitted nations of the world were disregarded. The military interchange was where all attention was focused.

After the strategic balance shifted dramatically, and the Soviet Union had within its power the ability to seriously damage the United States, it became necessary to consider a broader range of study in scenario construction. The problems of limited war emerged, driving scenario construction into a much more complex task. It became necessary to consider scenarios where the superpowers did something other than exchange nuclear blows, with the United States winning in the end. The opening scenario had to be much more definite about the conditions under which the conflict commenced and had to address any conditions which would or might act to limit the conflict. This led to the construction of multidimensional scenarios of considerable political and military complexity.

⁶⁷Ibid. p. 3.

IV. SCENARIOS IN USE

A. PRACTITIONERS

A phenomenon has taken place in the United States in the years since World War II which is beginning to make itself felt. It is a form of policy research, evolved from research and development; variously called futures research, prognostics, prospection, forecasting, futurecasting, futurism, futurology, and futurists.⁶⁸ Although futures research consists of much more now, a definition of its origins might be useful. Research and development are comprised of three activities:⁶⁹

1. Basic research - The exploration of the unknown. This is nondirected research with the desire to pursue knowledge for its own sake as the motivating influence.
2. Applied research - Research directed to satisfying a stated need. Applied research draws on basic research and generates additional knowledge.
3. Development - The systematic use of basic and applied research for the creation and production of tangible objects, systems, methods or materials.

A few definitions of futures research may be helpful at the onset:⁷⁰

1. A forecast is a probabilistic statement, on a relatively high confidence level, about the future.

⁶⁸Paul Dickson. Think Tanks Op. Cit. p. 310.

⁶⁹Ibid. p. 8.

⁷⁰Erich Jantsch, (ed.), Technological Forecasting in Perspective (Paris, Organization for Economic Co-operation and Development, 1967), p. 15.

2. A prediction is an apodictic (non-probabilistic statement) on an absolute confidence level about the future.
3. An anticipation is a logically constructed model of a possible future.
4. Technological forecasting is the probabilistic assessment, on a relatively high confidence level, of future technology transfer.
5. Exploratory technological forecasting starts from today's assured basis of knowledge, and is oriented toward the future.
6. Normative technological forecasting first assesses future goals, needs, missions, etc., and works backward toward the present.

The practitioners of futures research do not believe the future can be predicted exactly, because there are too many unknowns. However, they feel that man is creating his future with each decision, discovery, action or inaction. Since we are creating the future in the present, man should be in a position to determine at least part of it. With an increased perception of the consequences of actions and the possibilities which abound, more intelligent decisions become possible.

1. Future Studies

a. The Rand Corporation

The United States, during World War II, found itself at the forefront of the technological war. A corps of civilian scientists and engineers performed remarkable feats of research and development, on short notice, and usually against a deadline. At the end of the war, with this corps of civilians beginning to break up, the military decided to retain some of these people in order to develop military technology in the years ahead.

In late 1945, approval was granted for an arrangement between the Douglas Aircraft Company and the Army Air Force to be called Project Rand. Project Rand, Research AND Development, was to be a unique experimental institution with the stated mission of conducting "a program of study and research on the broad subject of intercontinental warfare other than surface."⁷¹

By 1948, pressure had grown to separate Rand from both Douglas and the Air Force. Project Rand became the Rand Corporation, a nonprofit, independent enterprise. According to its Articles of Incorporation, it was formed to "further and promote scientific, educational, and charitable purposes, all for the public welfare and security of the United States."⁷²

Early Rand studies covered such topics as the use of rockets for strategic weapons, nuclear propulsion, gaming theory as it applied to warfare, new concepts of air defense, new aircraft design, and high energy radiation. One early Rand study led to the adoption of in-flight refueling by military aircraft, while another led to the widespread use of titanium in aviation and space technology.

As Rand grew, the staff came to include political scientists, economists, psychologists, and others so that it would not be limited to the physical sciences. The Rand Corporation continues to be a vital aspect of the United States national security effort.

b. The Hudson Institute

The Hudson Institute was founded in 1961 by Herman Kahn at Croton-On-Hudson, New York. An interesting approach is used at Hudson; the membership of permanent

⁷¹Ibid. p. 23.

⁷²Ibid. p. 23.

fellows is held low, and a large number of outside consultants are utilized. The initial motto of the Institute was "National Security - International Order." The first five years of its existence were devoted almost exclusively to defense policy research, but that has gradually changed to include a variety of new areas.

The new motto which leads the Institute is "Policy Research in the Public Interest." Hudson now examines topics ranging from thermonuclear war through developing whole continents, and the future of the Western World. Research generated at Hudson is usually bold, outspoken, and very general.

c. The Club of Rome

The Club of Rome was formed in 1968 by a group of scientists, educators, economists, humanists, industrialists, and national and international civil servants from ten countries. The stated purposes of the club are to foster understanding of the interdependent components; such as economic, political, natural, and social, which make up the global system; and to bring that understanding to the attention of policy-makers and the public at large.⁷³ The Club believes that fundamental problems have arisen around the world not only as a result of past human failures, but also of past successes. The organization has a somewhat pessimistic viewpoint and believes that only an imaginative change in global relationships can make a positive impact. The solutions to the problems humanity faces, according to the Club of Rome, are:⁷⁴

⁷³Jan Tinbergen, coordinator, RIO: Reshaping the International World Order, A Report to the Club of Rome. (New York: E.P. Dutton, 1976) p. 63.

⁷⁴Ibid. p. 65.

1. Limits to growth.
2. A new international economic order.
3. New mechanisms to protect the poor from starvation in the midst of plenty.
4. New strategies for aid to the Lesser Developed Countries.
5. New understanding of the role and responsibilities of transnational enterprises.
6. New forms of governance of international common areas such as the oceans, seabeds, and the atmosphere.

Major global problems and opportunities are closely interdependent, and they interact over time in complex and unforeseen ways. The goal of a sustainable future requires learning to live within constantly changing natural and social constraints.

d. Global 2000

Global 2000 was a three volume report commissioned by President Carter and delivered in 1980. It is another example of the popular pessimistic outlook for the future of mankind. World production and gross world product per capita have been growing steadily for at least a century, with interruptions during the Great Depression and World War II; life expectancy, a major indicator of human welfare grows longer practically everywhere each year, and pollution levels in developed countries are gradually being reduced. World population growth rates, which caused such concern, peaked about a decade ago, and are gradually declining.⁷⁵ Despite these facts, Global 2000 paints the future in very somber colors. Its thesis is that if present trends continue, the world will be more crowded, more polluted, less stable ecologically, and more vulnerable to

⁷⁵Ernest Schneider, "Global 2000; an Analysis", Hudson Communique, November, 1981. p. 5.

disruption than it is now. Barring revolutionary advances in technology, life for most people on earth will be more precarious in 2000 than it is now - unless the nations of the world act decisively to alter current trends.⁷⁶ Global 2000 sounds this alarm even though its own projections forecast higher world income levels per capita, more food output per capita, longer human longevity, and declining rates of population growth.

2. Case Studies

a. Kahn

One major pioneer of scenario generation was Herman Kahn. He developed several seminar gaming techniques in the 1950s which are reflected in On Thermonuclear War. Since that time he expanded beyond the political-military realm and his later works are in the areas of economic and technological forecasting. Despite the shift in emphasis, his methodology has served well throughout the years and a variety of topics.⁷⁷

The late Herman Kahn was the founder, director, and chairman of the Hudson Institute. He was a pioneer and leader in the fields of public policy analysis and future studies, as well as being a physicist, mathematician and prolific writer.⁷⁸ In the course of his life, he became

⁷⁶Gerald O. Barney, (ed.), The Global 2000 Report to the President: Entering the Twenty-First Century. (Washington, Government Printing Office, 1980, 3 vols.) p. 12.

⁷⁷The seminar gaming techniques were presented in chapter 10 of On Thermonuclear War. Further works on the subject appeared in On Escalation: Metaphors and Scenarios.

⁷⁸Kahn authored such works as On Thermonuclear War (Princeton, Princeton University Press, 1961), Thinking About The Unthinkable (New York, Horizon Press, 1962), On Escalation: Metaphors and Scenarios (New York, Frederick A. Praeger, Publishers, 1965), The Next 200 Years: A Scenario for America and the World (New York, William Morrow and Company, Inc., 1976), The Year 2000: A Framework for Speculation (with Anthony J. Weiner) (New York, The MacMillan Company, 1967), The Emerging Japanese Superstate:

particularly interested in the problems of cultural, economic, and technological change.

Kahn made the study of the future, once the exclusive domain of science fiction writers and prophets, a vital part of the conduct of public policy and strategies of survival. Through the technique of scenario construction, and in conjunction with the statistics, projections and trends provided by demographics, economics, history and political science, sociology and the physical sciences, Kahn surmised that humanity is in the midst of a great transition.

The current trend of pessimism about the future, popular with the intellegensia, is that the population explosion, coupled with economic growth will prove catastrophic within a century; therefore, economic growth must be severely limited. Kahn's position is that natural social, political, and cultural forces are likely to slow the growth of both population and production long before the world encounters any fundamentally unmanageable problems of supply or environmental pollution. Rapid worldwide economic growth is desirable. The Third World must continue to industrialize, and advanced technology must be employed to a logical and reasonable degree. Human society is changing at an accelerating pace to a post-industrial condition which will eventually culminate in the worldwide emergence of new economic and social organizations.

Mr. Kahn's concern is to make it possible to plan ahead, to achieve the best possible course before the future is overcome by events. In his work The Year 2000 Kahn uses America as the focal point, and constructs a number of possible future scenarios. Probable power

Challenge and Response (Englewood Cliffs, N.J., Prentice Hall, 1970), World Economic Development, 1979 and Beyond (Boulder, Westview Press, 1979), The Coming Boom (Boulder, Westview Press, Inc., 1982).

alignments and international challenges to American security are examined in detail. Questions of process in technology and progress in planning and control of population growth, food supply, aggression, internal alienation and disruption, economic cooperation and the rise of new nationalism are all addressed.

As industrialization spreads and as the world economy as a whole becomes super-industrial, the system at first tends to become "problem prone" simply because of the scale and lack of expertise with the new technologies. . . we expect the super industrial society to become largely problem controlled sometime early in the next century, at which time the transition to a post-industrial economy can begin in earnest.⁷⁹

In The Coming Boom Kahn's research leads him to believe that the world economy should expect higher growth rates for several reasons. Some of these are:⁸⁰

1. Cyclical recovery - Kahn revives the concept of the Kondratieff cycle. Kondratieff was a Russian economist who lived in the late 1700s. He theorized long term cycles of price movements, interest rates, and wages in Western economies. Kondratieff's idea of long term is illustrated by the fact that he successfully predicted that the "Great Depression" would start in 1922. His theories have been out of vogue but are useful for insights and explanations of recent developments.
2. Adequate control of inflation is becoming a reality, and the costs of coping with residual inflation and the expectation of inflation are being reduced.

⁷⁹Herman Kahn, The Coming Boom. (Boulder, Westview Press, Inc., 1982) p. 46.

⁸⁰Ibid. p. 15.

3. Improvements in economic indexing. Kahn points out that when set in constant dollars, the federal deficit is no larger now than it was twenty eight years ago.
4. Energy success.
5. A long term capital boom is beginning, increased cash flow and savings are becoming evident.
6. Improvements in productivity are being made.

The projections of the future developed by Kahn are based upon a historical context which he states has passed through two phases so far.⁸¹ The first was the agricultural revolution which took place some ten thousand years ago and required eight thousand years to spread. The second phase is the "Great Transition" and started with the Industrial Revolution. The current world economy is classified as super industrial and technological. From this is projected the scenario of the future post industrial world economy.

Barring some "perverse combination of bad luck and bad management" the outlook for the future is decidedly optimistic. The dramatic increase in birthrates which started circa 1700 will peak in this century and begin declining. The major underlying reason for this will be the spread of technology/industrialization throughout the world. Children in urbanized/affluent societies are consumers, not producers as they were in more primitive societies in the past. In other words, there will be social and cultural forces imposing natural limits upon population and economic growth.

⁸¹Ibid. p. 28.

The technological battle is being fought even more intensely today, in peacetime, than it was fought at the height of hostilities in World War II. But a brand new thing has been introduced in the battle - no actual battles. We have today no substitute for the sobering effects of actual experience except pallid and hypothetical paper studies and peacetime tests. As a result, both the estimates and the expectations of each side are likely to be widely out of line with reality.⁸²

Before his research shifted to economic and social forecasting, Herman Kahn was intensely interested in the problems posed by the potentials of nuclear warfare. It was in this field that Kahn first became aware that scenarios could create "propaedeutic and heuristic methodologies and frameworks."⁸³

Propaedeutic is defined as introductory instruction, although with no suggestion of the elementary. Creative integration of ideas can normally be accomplished only in a single mind, therefore even a very sophisticated and knowledgeable policy-maker, analyst, or long range planner must absorb many ideas from unfamiliar fields. Heuristic refers to that which serves to discover or to stimulate investigations, or to methods of demonstration that lead a person to probe further. Heuristic techniques are not necessarily rigorous or scholarly but are valuable for obvious reasons nonetheless.

The approach to heuristic learning experience taken in On Thermonuclear War is the basis for Kahn's later exercises in scenario construction. He begins in chapter 8 with a synopsis of the real past, starting with World War I and ending with the atomic bombing of Japan in 1945. In the next chapter, a hypothetical past, starting in 1951 is created. This framework is used to discuss the emergence of

⁸²Herman Kahn, On Thermonuclear War. (Princeton, Princeton University Press, 1961) p. 386.

⁸³On Escalation: Metaphors and Scenarios Op. Cit. p. viii.

Russia as an Asiatic and European power, a peacetime revolution in the art of war, and to offer speculation on unexpected operational gaps.

Beginning with chapter 10 is a projection of possible future developments. Some of the items examined are:⁸⁴

1. Arms control effects and techniques.
2. Experimental nuclear explosives.
3. Satellites.
4. Soft and hard missile deployment systems.
5. Airborne command and control.
6. Civil defense possibilities.
7. Possible Soviet capabilities.
8. Long versus short war scenarios.

An interesting point made is that of the prematureness of minimum deterrence and the possibility of Soviet strategic superiority.⁸⁵ This was contrary to the popular wisdom of the time, but was a very astute observation, nonetheless.

b. Airland Battle 2000

Airland Battle 2000 is the document which the United States Army has designed to educate personnel at the flag rank what to expect in the battlefield of the future. The concept was designed to guide future organizational alignments, doctrine, training, and material requirements.⁸⁶ The methodology utilized by the Army was primarily trend extrapolation. Trends which the Army believes will affect society and specifically the military include:⁸⁷

⁸⁴Herman Kahn, On Thermonuclear War Op. Cit p. 453.

⁸⁵Ibid. p. 475.

⁸⁶U.S. Army, Airland Battle 2000 (Fort Monroe, Virginia, Headquarters, United States Army Training and Doctrine Command, August, 1982), p. 6.

1. Proliferation of Nuclear Technology.
2. Increased foreign investment in technology.
3. Dwindling U.S. production base.
4. Decreasing U.S. and Soviet military age population.
5. Growing worldwide urbanization.
6. More diverse lifestyles.
7. U.S. becoming an information based society.
8. Soviet power projection.
9. U.S. and Soviet investment imbalance.
10. World political and economic interdependence.
11. U.S. energy and strategic material dependency.

The Army recognizes that trends are often interwoven, if not dependent on one another; and paints an intentionally bleak picture for its general officers. Although they believe that conflict against the Warsaw Pact in Central Europe remains the most dangerous threat to American security, they do not consider it the most likely. The intention is to prepare for the "worst case" scenario, with the belief that smaller crises can be encompassed.

Some of the objectives of the Airland Battle 2000 concept include:

1. Prepare to fight anywhere. Worldwide turmoil caused by direct Soviet interference and their war by proxy methods make it necessary for the U.S. to develop forces which can operate in all types of terrain, climate, and warfare situations.
2. Win the land battle. The purpose of military operations cannot be simply to avert defeat or maintain the status quo, it must be to win.
3. Maintain weapons parity. Parity is gained through quality of weapons, reliance on technology, tactics, leadership, and national will.

⁸⁷Ibid. p. 8.

4. Avoid high combat losses. Victory must be sought through maneuver, advantageous positioning of forces, use of deception, psychological efforts to erode the enemy's will, and exposure of minimum friendly forces to destructive weapons effects.

The Army scenario for the battlefield of the next century is one dense with sophisticated combat systems whose ranges, lethality, and employment capabilities surpass anything known in contemporary warfare. The airspace over the battlefield will be saturated with aerial and space surveillance, reconnaissance, and target acquisition systems. The conflict will be intense and devastating, making it extremely difficult to exercise effective command and control. No single weapons system will dominate the battle, and it will be fought with integrated systems from all the services.

Battlefield mobility will be essential for success. Forces will plan from the outset to fight in the conventional, chemical, biological, nuclear, electronic environment.

c. Field Manual 100-5

There is no simple formula for winning wars. Defeating enemy forces in battle will not always insure victory. Other national instruments of power and persuasion will influence or even determine the results of wars. Wars cannot be won, however, without a national will and military forces equal to the task.⁸⁸

Field Manual 100-5 is the United States Army document concerned with their conduct of possible future conflicts. Should conflict occur, it is "the Army's keystone How to Fight manual."⁸⁹ The manual emphasizes conventional warfare

⁸⁸U.S. Army, Field Manual 100-5 (Fort Monroe, Va., Headquarters, United States Army Training and Doctrine Command, 1980) p. i.

but contains several sections devoted to operating in the nuclear and chemical environment.

The manual is a compilation of scenarios and responses covering a wide range of possible conflicts. It is divided into four basic parts:

1. The Army and how it fights - This section discusses challenges, combat fundamentals, weather and terrain, battlefield environments, combat support and logistics, tactical intelligence, and conduct of operations (command and control).
2. Offensive operations - A discussion of the purpose of the offense, maneuver warfare, operational concepts and a historical perspective (the battle of Vicksburg).
3. Defensive operations - Contains the fundamentals and scope of the defense, retrograde operations, defense and breakout of encircled forces and rear area protection.
4. Joint, contingency, and combined operations - NATO, a Pacific theater, other possibilities.

Appendix B is a statement of the United States Army's Principles of War. It is interesting to note that the principles as listed and defined are straight Clausewitzian; i.e., objective, offense, mass, economy of force, surprise, maneuver, etc. However, nowhere is von Clausewitz mentioned. Instead British Major General J.F.C. Fuller is credited with developing them during World War I. One might wonder what sort of military history is being taught at West Point.

⁸⁸Ibid. p. i.

B. POPULAR MIND

1. Survey of Themes of the Popular Mind

A selected survey of the literature of science and speculative fiction and non-fiction can illustrate an application of heuristic and intuitive forecasting methods to the field of National Security Affairs.

Robert Anson Heinlein, a 1929 graduate of the United States Naval Academy, has been called the dean of science fiction. He is noted not only for being a consummate storyteller, but also for grounding his works solidly in science fact. According to Heinlein, ninety percent of all science fiction is trash, which is simply an extension of "Sturgeon's Law" - ninety percent of everything is trash.⁹⁰ A good science fiction writer needs to know law, science, geography, technology, psychology, economics, military/political science, mechanical engineering, and an infinite number of other things if he is to make reasonable projections into the future. Construction of scenarios of possible futures is his livelihood. A very important attribute to success is an insatiable curiosity. All scenarios have assumptions; the more exacting the research, the more credible, plausible and relevant the scenario can be. In this respect, the writer of speculative fiction does much the same thing as such organizations as the Hudson Institute, The Club of Rome and the Rand Corporation. They all ask "what if?" questions. They all spend most of their time studying and the rest writing.

Much of science and speculative fiction has been heavily influenced by the socio-political realities of the times. For instance, during the late 1940s and early 1950s

⁹⁰Robert A. Heinlein, "Science Fiction and its Impact on American Society", (Forrestal Lecture Series, U.S. Naval Academy, 1973)

efforts such as the Acheson-Lilienthal Plan and the Baruch Plan were focusing much attention to the concept of international control of atomic weapons. Robert Heinlein constructed a scenario in which such an organization was realized, and then posed the question - who will watch the guardians? The result was the short story "The Long Watch." With its locale set on the moon, the story only preceded available technology by a decade or so, but pointed out some very real difficulties with a concept that was at the time under serious discussion.

2. Themes - Questions and Issues

At the turn of the last century, H.G. Wells published Anticipations in which he predicted some social changes with great accuracy and fell completely flat with others. Wells was one of the first writers to recognize the importance of technology and to attempt to derive social consequences from specific innovations.⁹¹ According to Wells, the nature of technology is that it is cumulative and it becomes diffused. In other words, it is cumulative due to a simple test of functional efficiency similar to cost benefit analysis; and it diffuses, or spreads, because the savings in time, effort, and money quickly become apparent.

Wells based most of his predictions on the revolutionary consequences of the changes in transportation both in overcoming the problem of distance and in spreading the span of organization.⁹² His reliance on technology lent a mechanistic cast to his thinking and Wells did not take into account the impact of individuals upon history.

⁹¹Herman Kahn, The Year 2000 Op. Cit. p. xviii.

⁹²Ibid. p. xviii.

Many others attempted early efforts at technological forecasting, with a strong emphasis on social consequences, in the field of science fiction literature. Science and Speculative Fiction, despite being designed as entertaining storytelling, is essentially an unstructured think tank in which authors of differing points of view can paint differing solutions or eventualities suggested by present problems or situations. The explorations of science fiction are normally for the purpose of testing an idea, a question, or a possibility in the literary library.

This genre is worthless as prophecy, which it was never intended to be. However, it has had an influence in the exploration of the human implications of science and technology. In addition, it has been useful for arousing interest in, and furthering the cause of, specific developments in science and technology. It is common knowledge that the first American space shuttle was named the Enterprise after the starship of television fame, not its naval predecessors. The Nautilus, the world's first nuclear powered submarine, drew its name from Captain Nemo's vessel in the novel 20,000 Leagues Under the Sea written by Jules Verne long before any serious attempt was made to split the atom. Many scientists or military men have described detailed systems, missions, and battle scenarios in the form of fiction. One famous example of this style writing was a series of works produced during and after World War I by the Italian Giulio Douhet, who predicted that future wars would be won by air power; and described some of the tactics and targets of such wars.⁹³ Douhet was wrong on many points, particularly his assessment of the effectiveness of strategic bombing, but he saw clearly and influenced the

⁹³Technological Forecasting and Long Range Planning Op. Cit. p. 5.

direction of future trends in warfare.⁹⁴

Since the time of H.G. Wells many writers of speculative fiction have attempted to forecast alternative future scenarios. Some, like George Orwell and Aldous Huxley, have been accepted into mainstream literature. Others will remain forever obscure. Many of the best writers of speculative fiction address themselves at some time in their career to subjects which are germane to the student of strategic planning. Warfighting, nuclear holocaust and post-holocaust environments are some examples.

Beyond this, however, are the background themes and issues found in the genre. Themes which reoccur in the field include:⁹⁵

1. The importance of technology and progress to the problem-solving process.
2. The importance of strong leadership to overcoming problems.

⁹⁴For an interesting and informative treatment of Douhet, Mitchell, Serversky, and the history of strategic bombing, see Bernard Brodie, Strategy in the Missile Age. (Princeton, Princeton University Press, 1959)

⁹⁵Some of the better examples available in the field of high technology, computers and robotics are Isaac Asimov, I, Robot (Greenwich, Conn., Fawcett Publications, Inc., 1950), and The Robots of Dawn (Garden City, N.Y., Doubleday and Co., Inc., 1983), Robert Heinlein, The Moon is a Harsh Mistress (New York, G.P. Putnam's Sons, 1966), Arthur C. Clarke, Rendezvous with Rama (New York, Ballantine Books, 1973), and Roger Zelazny, My Name Is Legion (New York, Ballantine Books, 1976). In the field of warfighting are a number of excellent works; such as, David Drake, Hammer's Slammers (New York, Charter Communications, Inc., 1979), Gordon Dickson, The Tactics of Mistake (New York, Daw Books, Inc., 1971), and (ed.) Combat SF (New York, Charter Communications, Inc., 1975), Robert Heinlein, Starship Troopers (New York, G.P. Putnam's Sons, 1959), and Jerry Pournelle, Jannisaries (New York, Ace Books, 1980), King David's Spaceship (New York, Simon and Schuster, 1980), The Mote in God's Eye (New York, Simon and Schuster, 1974). In the political/cultural area are Isaac Asimov, The Foundation Trilogy (New York, Doubleday and Company, Inc., 1950), Arthur C. Clarke, Childhood's End (New York, Ballantine Books, 1953), Robert Heinlein, Doublestar (New York, The New American Library, 1951), Revolt in 2100 (New York, Street and Smith Publications, Inc., 1939), Starship Troopers (New York, G.P. Putnam's Sons, 1959), The Moon is a Harsh

3. The ability of one man to make a difference.
4. The belief that there will be no absence of war and conflict.

One of the most prevalent, recurring themes in the popular mind is that of moral behavior and patriotism; not moral in the religious sense, but in the survival sense. Survival behavior is moral behavior, the simplest form is when a man fights to preserve his own life. The next level is when he fights to preserve his family. Another step up the ladder is when a man is willing to fight to protect a group larger than his immediate family, such as a village or tribe. When he is willing to give his life for a group so large he cannot possibly know all its members - that is called patriotism. The ultimate is to fight for the survival of the entire human race.

Another theme which surfaces quite often is that of the military and military trained individuals becoming essential to the reconstruction effort in a post-holocaust environment. For instance, Alas, Babylon written in 1959, and set in a small town in Florida, postulates the survival efforts of a community surrounded by the aftermath of a nuclear war between the United States and the Soviet Union. Although the town itself was not struck, the effects of the

Mistress (New York, G.P. Putnam's Son's, 1966), I Will Fear No Evil (New York, G.P. Putnam's Sons, 1970), and A.E. Van Vogt, The Weapons Shops of Isher (New York, Ace Publishing Company, 1951), and the World of Null-A (New York, Berkley Publishing Corporation, 1945). In the category of holocaust/post-holocaust the classic works are Pat Frank, Alas, Babylon (New York, Bantam Books, 1959), and Walter M. Miller, Jr. Canticle for Liebowitz (New York, J.B. Lippincott Company, 1959). However, there are many other fine examples such as Dean Ing, Single Combat (New York, Tom Doherty Associates, Inc., 1983), Alan Drury, The Hill of Summer (New York, Pinnacle Books, 1981), and The Promise of Summer (New York, Pinnacle Books, 1982), Robert Heinlein, Farnham's Freehold (New York, G.P. Putnam's Sons, 1964), and The Fifth Column Stephen King, The Stand (New York, New American Library, 1978), Larry Niven and Jerry Pournelle, Lucifer's Hammer (New York, Fawcett Crest, 1977), and David Graham, Down to a Sunless Sea (New York, Ballantine Books, 1981).

war were on all sides. Survival in the post-nuclear environment was handled well by the author, with a surprising amount of detail. The problem of organizing and protecting the community fell by default to the military reserve and retired officers who resided in the town at the beginning of the war. Governmental organization, police action and defense became the concern of those who were trained to lead and command.

In the course of examining the important works of the field, all the major theoreticians of Western reality can be found. Max Weber, Marx, Durkhiem, and Freud are all represented.

Examples of knowledgeable writers in this area include Robert Heinlein, Gordon Dickson, David Drake, and Jerry Pournelle. The ideas which are heavily stressed are specialization, universal rules, and functional multiplication (synergism). The membership of certain groups had to meet minimum criteria and abide by common rules.

An example of this style is Robert Heinlein's Starship Trooper. In this story, in order to become a citizen, military or governmental service was a requirement. One could exist as a resident without participating in a service; however, one could not vote, hold an elected office, or have any other rights associated with citizenship.

One finds the Freudian element represented by such authors as John Varley, Isaac Asimov, and Ray Bradbury. They delve into the question of social identity, impulses, emotions, and the concept of the mind as a closed system. Marx and Durkhiem theories of class and group identities can be found in a number of examples. One of the best is Robert Heinlein's The Moon is a Harsh Mistress. It combines class struggle, group identity, libertarianism, and high technology in a story of revolution. Set several centuries in

the future, the moon has become a giant Botany Bay, housing the majority of Earth's misfits, political prisoners, and criminals. Once sentenced, there is no returning to Earth. The colony has been in operation long enough that several generations were born there, however, all are treated as criminals. The society lives in large underground cities, with an economic system imposed by "Lunar Authority", an organization based on Earth and out of touch with its charges. The citizens of Luna, originally not a homogenous group, develop a group identity, as well as a feeling of patriotism toward what was formerly their prison as the revolt gains momentum. All in all, the book is an interesting study of a number of motivating theories.

This type of literature, while without value as a prediction tool, relates easily to Herman Kahn's arguments for scenario construction. It can serve to stimulate and stretch the imagination; clarify, define, name, expound and argue major issues. It can design and study many alternative policy packages and contexts as well as improve the perspective of decision-makers and increase their ability to react appropriately to the new and unfamiliar.

C. ALTERNATIVE COURSES

War is an art; it is not an exact science. Precisely because there is an intelligent opponent, there are real uncertainties about war, not merely statistical uncertainties which may be measurable. Every attempt to reduce war to an exact science has ended in dismal failure. The advent of the computer and systems analysis, useful as both may be, has not changed this fact, although it has often been forgotten.⁹⁶

⁹⁶The Strategy of Technology. Op. Cit. p. 15.

1. Hackett, et al.

An interesting development in the field of scenario building has been the professional soldier or political scientist writing on his subject for the popular market.⁹⁷ Examples of this are General Sir John Hackett's, The Third World War, and Show of Force by Charles D. Taylor.⁹⁸ Hackett, a retired NATO general, has put together a credible scenario for a Soviet offensive through the Fulda Gap into West Germany. It is quite detailed and draws heavily upon his many years of military experience in the defense of Western Europe.

Taylor, a naval historian has created a scenario of a United States - Soviet Union naval engagement in the Indian Ocean during a period of increased tensions between the two countries. His political background of the scenario could be stronger, but his expertise on naval weapons systems, capabilities, and tactics is very strong.

Both works are presented as dramatic accounts of the events leading to and resulting in armed clashes which could easily escalate to global conflict. A similarity between them is the reluctance of both superpowers to cross the nuclear threshold. Taylor's scenario, being solely a naval engagement, was credibly kept in the conventional arena. The Third World War, however, being set in the European environment, delves much deeper into the political-military decision-making processes concerning the possible use of nuclear weapons. As the Allied counter-offensive begins to

⁹⁷Other examples of this are: Whitley Strieber and James Kuneta, Warday and the Journey Onward, (New York, Holt, Rinehart and Winston, 1984), and Edward Zuckerman, The Day After World War Three. (New York, The Viking Press, 1979),

⁹⁸General Sir John Hackett, and other NATO officials, The Third World War: August, 1985 (New York, Berkley Publishing Company, 1978), and Charles D. Taylor, Show Of Force (New York, Charter Communications, Inc., 1981)

take effect, the questions arise as to political aims. Some of the options are:⁹⁹

1. A return to the status quo.
2. A reunified Germany - and the problems and fears which that would generate.
3. The possible advantages of pushing the Soviet Union back to the Russian borders and freeing all the Eastern European satellites.
4. The risk that a Western attack would trigger a nuclear war.

2. Pournelle

Liberty, in particular, was a primary goal of the Framers. However - important as the other goals may be, if we cannot provide for the common defense, we will not survive to celebrate the 200th anniversary of the Philadelphia Constitution.¹⁰⁰

An interesting cross between the ration paradigm and the radical empiricists is Dr. Jerry Pournelle. He is a highly respected contributor to the defense effort of the United States, as well as being a prolific writer in the fields of science and speculative fiction. In 1970, in conjunction with Stefan T. Possony, Dr. Pournelle wrote The Strategy of Technology. The book described the present state of technological decision-making, used examples to illustrate past mistakes, and provided suggestions for future approaches to a strategy of technology designed to win the "Technological War."¹⁰¹

⁹⁹The Third World War: August, 1985 Op. Cit. pp. 362-365.

¹⁰⁰J.E. Pournelle (ed.) Men of War. There Will Be War. Vol. II. (New York, Tom Doherty Associates, Inc., 1984) p. 11.

¹⁰¹Ibid. p. 36.

Elements of a technological strategy, as proposed, entail a fundamental restructuring of the entire decision process to allow "government of the Technological War according to a strategy, rather than by a series of independent technological or scientific decisions."¹⁰² Strategic analysis is at the core of this strategy, with the purpose of seeking the proper use of available and future weapons; orchestration of research plans, hardware construction, intelligence operations, or even future battles. Some of the elements which affect strategic analysis were presented in chapter two in the discussion of the defense effort.

During the 1960s Dr. Pournelle worked as editor and principal investigator for the Ballistic Systems Division of the United States Air Force Systems Command. His research was for a program called Project 75. Project 75, at the time highly classified, pulled together into one document everything known and predictable about ballistic missile technology; structures, guidance, accuracy, warheads, yields, basing modes, security, command and control, and communications.

Project 75 dealt with the real and projected capabilities of the United States, and contained the best estimates available of Soviet current and projected capabilities. From this was drawn a study on stability and strategic doctrine. The experience Pournelle gained working on these projects formed much of the basis for his later works both in political science and science fiction.

The Pournelle theory of deterrence is very simple: When defensive systems are stronger than offensive ones, the situation is stable. When the offense dominates, it isn't.¹⁰³ This is contrary to the popular theories of

¹⁰²Ibid. p. 59.

¹⁰³Ibid. p. 356.

Assured Destruction and Mutually Assured Destruction. In the Strategy of Technology the authors proposed a doctrine of Assured Survival. This was not well received among most defense intellectuals. Pournelle's point is that if you don't have a defense, and your offensive systems are rendered vulnerable, you are left with nothing except a first strike capability - hence a destabilizing situation. Active defenses should be high on the priority list.

Pournelle uses the vehicle of science fiction to reach untold numbers of people with his message of a strong national defense and the necessity to defend the freedoms Americans enjoy. Some of this audience might become more aware of the nature of the struggle because of this; every one is a victory.

Throughout the recent decades when the United States military was not very popular with the citizenry it protected, the genre of science and speculative fiction upheld respect for the profession of arms. In other parts of the world, military history is a respected intellectual discipline. In the United States, since the Vietnam War, that has not been the case. In fact, since the close of World War II, the United States military has not provided a good showing, nor had the opportunity to prove its worth. The advent of nuclear weapons has created a superpower balance which has precluded the use of American conventional military force in many instances. The result so far of America's disaffection of her military has been the advent of the all volunteer force. For a number of years, both the military and anyone who studied war were held in a good deal of contempt. This state of affairs is changing, as well it should. A nation which despises its soldiers will all too soon have a despicable army.

The depressing fact is that history is remarkably clear on one point: Wealthy republics do not last long. Time

after time they have risen to wealth and freedom; the citizens become wealthy and sophisticated; unwilling to volunteer to protect themselves; they go to conscription; this to become intolerable; and soon enough they turn to mercenaries.¹⁰⁴

This is not to say that the United States Military is becoming a mercenary force. On the contrary, the country is currently experiencing a rebirth of patriotism, and coming to the realization that our pluralistic, open society is worth protecting. The challenge, then, is to nurture these new old feelings and provide the country and the military with positive goals and objectives.

A revolutionary force, as distinguished from a reactionary force, is one which moves not backward against the flow of change but forward with it...The one force which can claim the revolutionary title in the world we live in, the one force which can claim to move in the direction of life, is the force that Jefferson put into words.¹⁰⁵

America can recapture the revolutionary spirit which is her heritage, and can regain the initiative in the technological war. The merger of systems analysis and strategic analysis; the empirical and the intuitive, is an important step in that direction.

¹⁰⁴ Jerry Pournelle, Introduction to David Drake, Hammer's Slammers. Op. Cit. p. vi.

¹⁰⁵ Archibald Macleish, "The Conquest of America", The Atlantic. March, 1980.

V. CONCLUSION

The technological war in which the United States has been engaged since World War II has placed burdens unprecedented in their complexity and consequence upon the national defense effort. Ways must be found to increase the competence of personnel at all levels. Administratively the government must make improvements in the process of decision-making. Political as well as physical survival may well hinge on the speed and efficiency with which technology is converted into weapons and weapons systems; and the speed and efficiency with which policy, strategic, and tactical planning is developed to employ them. Men and material are still important, but economic and political factors have assumed critical importance. In order to continue to meet the threat the United States will be increasingly dependent upon its intellectual, scientific, and economic resources. Not only must these resources be readily available, but they must be competent and reliable. One of the requirements of the technological war is strategic analysis. It is the synthesis of the quantitative with the intuitive.

There have been three basic phases of intellectual development in the American defense effort this century. The first, from 1920 to 1945, was the historical/legal descriptive. This period was stimulated by education and strong policy-makers. It was characterized by isolationism and the beginnings of American international diplomacy and the growth of international law. From 1945 to 1975 was the behavioral period. The behavioral period was characterized by the rationalization process, the advent of systems analysis, and the application of empirical methods to the process of decision-making. Scientists were employed to

apply reason and the scientific method to policy-making. With McNamara as Secretary of Defense, "the best and brightest syndrome" drove the defense effort. This period reached its climax in Vietnam; with the realization that it was not the be-all end-all as previously advertised.

One of the major shortfalls of the empirical methods is the lack of a long haul concept. Planning takes place only in relation to individual decisions, usually driven by budgetary considerations. Another problem is the tendency of empirical evidence to drive non-quantifiable evidence from the decision-making process; "If it doesn't fit the balance sheet, it can't be important." The most recent phase is characterized by a reaction against the excesses of behavioralism experienced in the recent past, and a realization of the need for synthesis. The rational paradigm began to develop during the first phase, reached its zenith in the second, and has begun its demise in the third. However, it cannot be allowed to fall by the wayside; the methodology and concepts provided are too valuable.

A. PRACTITIONERS AS ARTISTS

While no-one can refute the value of empirical research and the scientific method, recent history has forced us to admit the limits of rational discourse. While the benefits that have accrued are visible everywhere, we have been forced to expand our definition of empiricism. The problem has been and continues to be the tendency to forget that we exist in a pluralistic universe requiring a multidimensional mindset. Theories, as William James once said, "are instruments not answers to enigmas in which we can rest." The issue therefore, is to construct multidimensional intellectual instruments positioning the rational and intuitive in a mode useful to the practitioner. The goals and objectives

must be identified first, then empirical research can be employed in the search for alternative solutions. Even in that mode empirical research alone cannot do the entire job; hence enter the intuitive, the speculative, the creative.

The defense of the United States is too important a problem to not utilize all the assets available for the job. A synthesis of the rational paradigm with radical empiricism is necessary. Any variable which might be important, no matter what the source, must be admitted to the planning equation. There is no place for any one group to have the hubris to believe that they alone can provide all the answers. Imagination is central to the concept of strategic analysis in the American context.

In the search for viable alternative policy solutions, speculative, imaginative, and intuitive approaches must be examined in addition to the quantifiable evidence. This approach could yield a synergistic effect, producing a result greater than the sum of its parts. The synthesis of the empirical and intuitive methods can be the guiding force which the American defense effort currently lacks.

B. ADMINISTRATION, MOTIVATION AND REALITY

Charles Evans Hughes once observed, "all plans for betterment must pass the crucial test of administration." So it is with the development of a functional and professional cadre of strategic planners in the United States Navy.¹⁰⁶ We know the intellectual and attitudinal preparations; we have the personnel and other resources to develop the capability. We now need a change in the personnel policies of the Navy and other military services so that talented individuals may be motivated and developed within a

¹⁰⁶For additional information, see Charles E. Milsted, Jr. A Corps of Naval Strategists. (Monterey, Ca., Naval Post-Graduate School, June, 1983)

career pattern that is professionally viable.

It is worth pointing out again that a single man or a few people with a good idea, who have contact with one senior decision-maker, can gain adoption of a plan with which ninety percent¹⁰⁷ of the other decision-makers and advisors disagree.

If strategic analysis is to be utilized to combat the pitfalls of systems analysis, and if these people with a truly strategic view are to implement the synthesis of the empirical and the intuitive, significant change must be made in the way we organize the nation's vital personnel assets. Neither the Navy or the nation can continue to approach the complexities of policy decisions on an ad-hoc basis.

To become the planner that we envision requires time. One must be able to intellectually link not only alternative courses but also entire disciplines and methodologies. That these persons exist and must be gleaned from the established personnel system is recognized.

There are many embryo good naval planners in the fleet today... They read a lot. They are extremely observant and curious, rarely opinionated, and always learning about things outside their assigned specialty.¹⁰⁸

The fact that good potential planners exist is true, not only for the Navy, but across the spectrum of the United States Military Officer Corps. The problem is that there is no premium put upon these talents. In order for these officers to maintain the positive attributes of imagination and curiosity they must persevere a system which demands other abilities.

¹⁰⁷ On Thermonuclear War, Op. Cit., p. 408.

¹⁰⁸ "Great Operators, Good Administrators, Lousy Planners.", P. 78.

C. CHANGE AND COMPLEXITY

The speed of change and the increasing complexity of the threat, along with increased economic, political and temporal costs of weapons and strategies has fundamentally pointed out that planning is the preface of management. Planning, especially in the defense sector, requires intellectual breadth and an administrative reformation.

While the task may seem formidable, one must remember that the American military is a most adaptable social institution. When called upon to respond to other great social changes in American society, the military not only responded, but in several instances actually led the way. As it becomes increasingly clear that planning in terms of the modern requirements is a vital necessity, there is reason to hope that the military will respond in a manner appropriate to its commitment in the defense of a changing pluralistic democracy which Jefferson once described as the last great hope of mankind.

BIBLIOGRAPHY

- Asimov, Isaac. I, Robot. Greenwich, Conn.: Fawcett Publications, Inc. 1950.
- Asimov, Isaac. The Robots of Dawn. Garden City, New York: Doubleday and Company, Inc. 1983.
- Asimov, Isaac. The Foundation Trilogy. New York, N.Y.: Doubleday and Company, Inc. 1950.
- Ayres, Robert U. Technological Forecasting and Long-Range Planning. New York, N.Y.: McGraw Hill Book Company, 1969.
- Barney, Gerald O., (ed.) The Global 2000 Report to the President: Entering the Twenty-First Century. Washington, D.C.: A Report Prepared by the Council on Environmental Quality and the Department of State. Government Printing Office. 1980. 3 vols.
- Brewer, Garry D. and Shubik, Martin. The War Game: A Critique of Military Problem Solving. Cambridge, Mass.: Harvard University Press, 1979.
- Brodie, Bernard Strategy in the Missile Age. Princeton, New Jersey: Princeton University Press, 1959.
- Brown, Bernice B., Helmer, O., and Dackley, N.C. The Delphi Technique, II: Structure of Experiments. Santa Monica, Ca.: The Rand Corporation. June, 1969.
- Brown, Bernice B. Delphi Process: A Methodology for the Elicitation of Opinion Experts. Santa Monica, Ca.: The Rand Corporation. September, 1968.
- Clarke, Arthur C. Rendezvous With Rama. New York, N.Y.: Ballantine Books. 1973.
- Clarke, Arthur C. Childhood's End. New York, N.Y.: Ballantine Books. 1953.
- Dackley, Norman C. and Helmer, O. An Experimental Application of the Delphi Method of the Use of Experts. Santa Monica, Ca.: The Rand Corporation. July, 1962.
- Dackley, Norman C. Delphi. Santa Monica, Ca.: The Rand Corporation. October, 1967.
- Dakley, Norman C. "An Experimental Study of Group Opinion. The Delphi Method." Futures. September, 1969.
- DeLeon, Peter. Scenario Designs: An Overview. Santa Monica, Ca.: The Rand Corporation. June, 1973.
- DeWeerd, H.A. Political-Military Scenarios. Santa Monica, Ca.: The Rand Corporation., February, 1959.
- Dickson, Gordon. The Tactics of Mistake. New York, N.Y.: Daw Books, Inc. 1971.
- Dickson, Gordon. (ed.) Combat SF. New York, N.Y.: Charter Communications, Inc. 1975.

- Dickson, Paul. Think Tanks. New York, N.Y.: Athenum, 1972.
- Drake, David. Hammer's Slammers. New York, N.Y.: Charter Communications, Inc. 1979.
- Drury, Alan. The Hill of Summer. New York, N.Y.: Pinnacle Books. 1981.
- Drury, Alan. The Promise of Summer. New York, N.Y.: Pinnacle Books. 1982.
- Featherstone, Donald. Battlenotes for Wargamers. New York, N.Y.: Drake Publishing, Inc. 1974.
- Fisher, Gene H. Cost Considerations in Systems Analysis. New York, N.Y.: Elsevier, 1971.
- Frank, Pat. Alas, Babylon. New York, N.Y.: Bantam Books. 1959.
- Glikes, Richard J., "An Approach to Long-Range Strategic Planning." Carlisle Barracks, Pennsylvania: United States Army War College Strategic Studies Institute., 1978.
- Goldhamer, Herbert and Speier, Hans, Some Observations on Political Gaming. Santa Monica, Ca.: The Rand Corporation. 1959.
- Graham, David. Down to a Sunless Sea. New York, N.Y.: Ballantine Books. 1981.
- Hackett, General Sir John, and other NATO officials, The Third World War: August, 1985. New York, N.Y.: Berkley Publishing Company, 1978.
- Heinlein, Robert A., "Science Fiction and Its Impact on American Society.", Speech presented at Forrestal Lecture Series, United States Naval Academy, 1973.
- Heinlein, Robert A. The Moon is a Harsh Mistress. New York, N.Y.: G.P. Putnam's Sons. 1966.
- Heinlein, Robert A. Starship Troopers. New York, N.Y.: G.P. Putnam's Sons. 1959.
- Heinlein, Robert A. The Fifth Column. New York, N.Y.: G.P. Putnam's Sons. 1960.
- Heinlein, Robert A. Doublestar. New York, N.Y.: The New American Library. 1951.
- Heinlein, Robert A. Revolt in 2100. New York, N.Y.: Street and Smith Publications, Inc. 1939.
- Heinlein, Robert A. Farnham's Freehold. New York, N.Y.: G.P. Putnam's Sons. 1964.
- Helmer, O. and Rescher, N. On the Epistemology of the Inexact Sciences. Santa Monica, Ca.: The Rand Corporation. February, 1959.
- Hertz, David B. (ed.) Publications in Operations Research Series. New York, N.Y.: John Wiley and Sons., 1972.
- Hill, Kim Quaile. "Trend Extrapolation." The Procedures of Futures Research. n.d.

- Hirshleiffer, Jack and Shapiro, David L. "The Treatment of Risk and Uncertainty" Public Expenditures and Policy Analysis. Robert H. Haveman. (ed.) Chicago, Ill: Markham Publishing Company. 1979.
- Hitch, Charles J. and McKean, Roland N. The Economics of Defense in the Nuclear Age. New York, N.Y.: Atheneum, 1978.
- Huber, Reiner K., Neimeyer, Klaus and Hofmann, Hans W., (eds.) Operations Research Games for Defense. Munich, Republic of West Germany: Oldenburg Verlag, 1979.
- Ing, Dean. Single Combat. New York, N.Y.: Tom Doherty Associates. 1983.
- Jantsch, Erich (ed.) Technological Forecasting in Perspective. Paris, France: Organization for Economic Co-operation and Development. 1967.
- Kahn, Herman. On Escalation: Metaphors and Scenarios. New York, N.Y.: Frederick A. Praeger, Publishers, 1965.
- Kahn, Herman and Weiner, Anthony J. The Year 2000: A Framework for Speculation. New York, N.Y.: The Macmillan Company. 1967.
- Kahn, Herman. The Emerging Japanese Superstate: Challenge and Response. Englewood Cliffs, New Jersey: Prentice Hall. 1970.
- Kahn, Herman. World Economic Development, 1979 and Beyond. Boulder, Colorado: Westview Press. 1979.
- Kahn, Herman. Thinking About The Unthinkable. New York, N.Y.: Horizon Press. 1962.
- Kahn, Herman. The Next 200 Years: A Scenario for America and the World. New York, N.Y.: William Morrow and Company, Inc., 1976.
- Kahn, Herman. The Coming Boom. Boulder, Colorado: Westview Press, Inc., 1982.
- Kahn, Herman. On Thermonuclear War. Princeton, New Jersey: Princeton University Press. 1961.
- King, Stephen. The Stand. New York, N.Y.: The New American Library. 1978.
- Lindblom, Charles E., "The Science of Muddling Through." The Public Administration Review, June, 1959.
- Linstone, Harold A. "The Delphi Technique." The Procedures of Futures Research. March, 1976.
- MacLeish, Archibald. "the Conquest of America." The Atlantic. March, 1980.
- Manheim, Jarol B. and Rich, Richard C. Empirical Political Analysis. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1983.
- McHugh, Francis J. Fundamentals of War Gaming. Newport, R.I.: The Naval War College, 1966.
- Miller, Walter M., Jr. Canticle for Liebowitz. New York, N.Y.: J.B. Lippincott Company. 1959.

- Milsted, Charles E., Jr. A Corps of Naval Strategists. Monterey, Ca.: Naval Post-Graduate School. June, 1983.
- Nathan, James A. and Oliver, James K. United States Foreign Policy and World Order. Boston, Mass.: Little, Brown and Company, 1981.
- O'Rourke, Gerald G., "Great Operators, Good Administrators, Lousy Planners.", United States Naval Institute Proceedings. August, 1984.
- Overholt, John. (ed.) First War Gaming Symposium Proceedings. Washington, D.C.: Washington Operations Research Council, 1961.
- Phillips, J.B. "Manual War Gaming." First War Gaming Symposium Proceedings. Washington, D.C.: Washington Operations Research Council, 1961.
- Pournelle, Jerry and Possony, David. The Strategy of Technology. New York, N.Y.: Columbia University Press, 1970.
- Pournelle, Jerry, There Will Be War. New York, N.Y.: Tom Doherty Associates, Inc., 1983.
- Pournelle, Jerry, Men Of War. There Will Be War. Vol. II. New York, N.Y.: Tom Doherty Associates, Inc., 1984.
- Pournelle, Jerry. Janissaries. New York, N.Y.: Ace Books. 1980.
- Pournelle, Jerry. King David's Spaceship. New York, N.Y.: Simon and Schuster. 1980.
- Pournelle, Jerry. The Mote in God's Eye. New York, N.Y.: Simon and Schuster. 1974.
- Pournelle, Jerry and Niven, Larry. Lucifer's Hammer. New York, N.Y.: Fawcett Crest. 1977.
- Quade, E.S. Analysis for Military Decisions. Chicago, Ill.: Rand McNally and Company, 1966.
- Quade, E.S. Analysis for Public Decisions. New York, N.Y.: Elsevier, 1975.
- Quade, E.S. Systems Analysis and Public Policy. New York, N.Y.: Elsevier, 1968.
- Rosenau, James. "Pre-Theories and Theories of Foreign Policy." Approaches to Comparative and International Politics. R. Barry Farrell, (ed.) Chicago, Ill.: Northwestern University Press, 1966.
- Schneider, Ernest, "Global 2000; An Analysis." Hudson Communique, November, 1981.
- Siegel, Irving H., "Technological Change and Long Run Forecasting.", The Journal of Business of the University of Chicago, July, 1954.
- Strieber, Whitley and Kunetka, James Warday and the Journey Onward. New York, N.Y.: Holt, Rhinehart and Winston, 1984.
- Taylor, Charles D., Show Of Force. New York, N.Y.: Charter Communications, Inc., 1981.

Teti, Frank M., "The Public Interest: In Search of an Operational Definition.", Prepared for the American Society of Public Administration, n.p., n.d.

Tinderburg, Jan, (ed.) RIO: Reshaping the International World Order. A Report to the Club of Rome. New York, N.Y.: E.P. Dutton, 1976.

Tolg, R.G., et. al., "The Maritime Balance Study. The Navy Strategic Planning Experiment", Washington, D.C.: Office of the Chief of Naval Operations, 15 April, 1979.

Turoff, Murray, "The Design of a Policy Delphi." Technological Forecasting and Social Change. vol. 2, no. 2, 1970.

Weiner, M.G. War Gaming Methodology. Santa Monica, Ca.: The Rand Corporation., July, 1959.

Wilson, Andrew. The Bomb and the Computer. New York, N.Y.: Delacorte Press, 1968.

United States Army. Airland Battle 2000. Fort Monroe, Va.: Headquarters, United States Army Training and Doctrine Command. August, 1982.

United States Army. Field Manual 100-5. Fort Monroe, Va.: Headquarters, United States Army Training and Doctrine Command, 1980.

Zuckerman, Edward The Day After World War Three. New York, N.Y.: The Viking Press, 1979.

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