UC Berkeley

Title

Implementation of Evaluation and the Systems Approach in Government: A Literature Survey and Conceptual Model

Permalink

https://escholarship.org/uc/item/7f83j9fg

Author

Siebert, Glenn

Publication Date

1973

IMPLEMENTATION OF EVALUATION AND THE

SYSTEMS APPROACH IN GOVERNMENT:

A LITERATURE SURVEY AND CONCEPTUAL MODEL

by

Glenn Siebert

January, 1973

Working Paper No. 201/RS016

Frederick C. Collignon, Project Director - Michael B. Teitz, Principal Investigator

Project for Cost Benefit Analysis and Evaluation of Rehabilitation Services

FOREWORD

A criticism which is increasingly plaguing program evaluators
is that evaluation reports too frequently end up "on the shelf" without
having produced any improvement in the program. This paper by Glenn Siebert
seeks to improve our understanding of the process of evaluation and or-
ganizational change, and to offer suggestions on how to conceive and
conduct program evaluation in such a way that implementation of evaluative
recommendations will become more probable.

The paper is only superficially a review of the literature,
although an extensive survey is reported. More important is the synthesis
toward which Mr. Siebert is moving. He basically is offering a new
framework for considering evaluation activity, a framework based upon
organization theory and problem-solving, rather than upon research,
science, and fact-finding. The adoption of such a perspective by some
evaluators will result in movement away from the traditional focus in
evaluation upon experimental design, sampling, and data analysis. Such
research skills will remain very important, but will constitute only
part of the skills needed by an effective program evaluator. As important
will be skills in process evaluation, interpersonal relationships, the
formulation of the policy and management issues to be addressed by eval-
uation, organizational analysis and management, and staff training. The
process of evaluation and the participation by the individuals who will

have to implement evaluation findings will be attributed with as much importance as the establishing of control groups and the securing of "outside" evaluators with methodological expertise.

Mr. Siebert is a Ph.D. candidate in the Interdisciplinary Studies Program at the University of California, Berkeley. He has extensive experience in program evaluation having served as consultant to government agencies and as supervisor of the Operations Research Group of the State of California Department of Human Resources Development. The research reported in this paper was begun under funding from the Technical Analysis Division of the National Bureau of Standards and was completed with funding by an evaluation research grant from the Rehabilitation Services Administration of the U.S. Department of Health, Education, and Welfare.

Frederick C. Collignon
and Michael B. Teitz

TABLE OF CONTENTS

I. INTRODUCTION

One of the major problems that has inhibited the development and
utilization of the systems approach in non-defense government programs
has been the lack of implementation of systems studies. Yet relatively
little research has been done on ways to improve the implementation of
studies. The current literature on implementation is meager and most
definitions of implementation are unsatisfactory. It seems clear that
implementation is not a separable component of the systems study: the
analyst who says "I have completed the study, now tell me how to, (or
let someone else), implement it" may have already guaranteed his own
failure. This report reviews some of the literature on the problems of
implementation and presents a framework for the exploration of actions
that can improve the effectiveness of the systems approach.

1. Background and Nature of the Problem

The automobile, the computer, sliced bread, and the systems
approach are here to stay. In a few short decades, the systems approach
developed from an unknown entity into its current status, so aptly
described by one Washington official, as the "brass ring to the budget."
The very success of the systems approach has helped to spawn a host of
new analytic roles such as policy analyst, systems analyst, and program
evaluator. The systems approach has demonstrated an ability to make
manageable the unmanageable, to stimulate innovation, to improve social
delivery systems, and even to propel its sponsors to rapid promotions.

Yet the road to progress is necessarily paved with discontent. Expectations precede achievement. If managed properly, the resulting tension leads to progress; if managed improperly, it leads to disillusionment and apathy. The underlying assumption throughout this paper is that the "problem of implementation" is best understood not as an objective description of a "real" problem (as one could conclude from the literature), but rather as a normative imperative designed to raise expectations and thereby to stimulate progress. In other words, implementation is the current strategic factor that must be solved before analysis can progress.

Like a caterpiller entering his cocoon, recent university graduates enthusiastically jump into the problems of government, fully expecting to triumphantly emerge on the brilliant orange and black wings of an evaluation or a resource allocation model. But time passes and the metamorphosis does not occur. Disillusionment sets in; the blame is placed. Implementation is the culprit. Against this motivational background the search goes on for ways to improve implementation. Although always painted on the same canvas, the "problem of implementation" takes on a variety of forms that often reflect the study objectives and the personality and world view of the analyst.

The following cases, (which, to paraphrase Steinbeck, are not necessarily false even if they didn't necessarily happen), are examples of systems projects that encountered problems in implementation.

Case A: Inventory evaluation for medium size state agency. Recommendation: Install perpetual inventory accounting system. Status: management accepted three years ago; no action taken since.

Case B: Inventory evaluation for large state agency. Recommendation: automate. Status: management accepted, programs developed and operating; stock levels increased 25% due to transition and user hoarding.

Case C: Systems evaluation of coal mining operation. Recommendation: modernize equipment and methods. Status: management accepted, equipment installed and workers reorganized; production significantly lowered due to worker dissatisfaction.

Case D: Personnel turnover evaluation for a county agency. Recommendation: administer personality tests to personnel and determine relationship to job mobility. Status: management accepted, tests developed and administered; findings published but ignored by management.

Case E: Family planning for an overpopulated community. Recommendation: provide free contraceptives and instruction. Status: accepted, organization created to provide free services; population growth rate undiminished due to economic incentives for large families.

Case F: Cost-effectiveness analysis of day care centers for a Federal agency. Recommendation: submit budget request for expansion. Status: management accepted, request submitted to Congress; request denied.

Case G: Evaluation of social service delivery system. Recommendation: eliminate duplications of effort and coordinate planning process; eliminate certain non-productive activities. Status: management rejected due to "political infeasibility."

Implementation is a major concern of all practioners who are sincerely interested in improving the effectiveness of the scientific method in helping government agencies to solve social problems. It is of equal concern both to policy analysts (planners, management scientists, etc.), whose intellectual roots are in the Rationalist tradition (Leibniz,

et. al.), and to program evaluators (social scientists, etc.), whose intellectual roots are in the Empiricist tradition (Locke, et. al.).

2. Report Objectives and Scope

The objective of this report is to orient the reader to a wide range of literature on implementation and to describe a framework that is useful for reading about and understanding the problem of implementation. No attempt will be made to fully explain (or evaluate) the contributions of the numerous authors cited. The objective of this report will be achieved if the reader:

1) obtains a better understanding of the cognitive terrain underlying the literature on implementation,

2) gains additional insight or clarifies his own thoughts about implementation, and

3) obtains references for further exploration of those areas of interest to him.

The following section contains a brief description of some of the available literature on implementation. It is not comprehensive but should serve to orient the reader to some of the significant works.

Section three explores a number of different world views that seem defensible yet can lead to striking differences in definitions of success and implementation.

Section four contains a conceptual model of a systems approach project and its major components, identifies some common errors in project management, and identifies some important questions for each project.

Section five contains a bibliography of publications that deal with implementation.

II. PROBLEM DISCUSSION

This section is organized into four parts: 1) The Systems Approach: What is it?; 2) Success: What is it?; 3) Implementation: What is it?; and 4) Implementation: How is it achieved?

1. The Systems Approach: What is it?

Philosophers of science frequently consider as fruitless efforts to authoritatively define concepts such as the systems approach in a few words (Kaplan, 1964). Yet we use words such as the systems approach and we explain their meaning to a variety of individuals.

Churchman, who has been called the philosopher of management science (Hertz, 1971), emphasizes an understanding of the development of western philosophy in order to understand the systems approach (Churchman, 1971). Much of the controversy over the systems approach can be seen to be a replay of arguments of Leibniz, Locke or Hegel. Churchman (1970) describes the systems approach as a profession whose objective is to secure improvements in social systems by means of the scientific method. This description, not meant to be a complete definition, draws attention to four primary concerns of the systems approach. These concerns are:

1) developing a professional orientation,

2) securing a change in the client system (i.e., implementation),

3) improving the measure of effectiveness of the client system, and

4) using the scientific method.

Analysts typically think of themselves not as "systems approachers" but rather as (for example) program evaluators, operations researchers, policy analysts, management scientists, management analysts, cost-effectiveness analysts, systems analysts, industrial engineers, planners, MIS analysts, PPB analysts, organizational development analysts, or research analysts. The very diffusion of scientific methods and approaches may be one mark of its success (Radnor, 1968). Of course, there are significant differences in the characteristic methodology and subject matter for each type of analysis. However when it comes to implementation, these differences seem to melt away and everyone faces a common problem. Furthermore, there appears to be a strong tendency towards convergence of these various types of systems approach. For example, program evaluators are beginning to recognize the fact that a pure empirical approach is insufficient -- they need systems models to know what difference their observations make. On the other hand, operations research analysts are beginning to recognize the fact that a pure rational approach is insufficient -- they need evaluation techniques to determine goals and to test their models. Throughout the remainder of this report the term "systems approach" will be used with the intention that the reader can freely translate "systems approach" to his own area of analytic concern, e.g., to "program evaluation."

White (1972) presents a clarification of the meaning of operations research/management science (OR/MS) by tracing the historical development of OR/MS and by analyzing various definitions published in textbooks and journals. At least two general trends emerge. The Operations Research Society of America (ORSA) seems to have developed out of a strong military

experience with an applied mathematics orientation. The Institute of Management Science (TIMS) seems to have emerged out of an industrial-university experience with a broader-based, social science orientation.

An introductory text identifies the essential characteristics of OR/MS as "(a) its system (or executive) orientation, (b) the use of interdisciplinary teams, and (c) the application of scientific method to problems of control" (Ackoff and Sasieni, 1968).

Other authors emphasize the subject matter rather than the methodology. For example, on a two dimensional scale of macro-micro and normative-descriptive, OR/MS has been viewed as "normative microeconomics" (Simon, 1959).

If one looks to university curricula to define operations research, one finds an emphasis on applied mathematics. A master's degree may consist exclusively of course work in mathematical programming and stochastic processes. A recent issue of Management Science was devoted to a discussion of the educational issue (MS, 17, October, 1970).

Morse (1970) observes that "Operations Research has emerged as a unified area of applied science, (characterized) by its combination of measures of effectiveness, justified by operational experiments, with mathematical models for predicting the efficiency of future operations, all designed to influence policy."

Suchman (1967) defines evaluation as "the determination (whether based on opinions, records, subjective or objective data) of the results (whether desirable or undesirable, transient or permanent, immediate or delayed) attained by some activity (whether ultimate, intermediate or immediate, effort or performance, long or short range)." In other words, evaluation is the determination of the results of some purposeful activity.

Wholey (1970) defines evaluation in terms of subject matter ("the effectiveness of an on-going program"), methodology ("research design"), and objectives ("program improvement through a modification of current operations").

Kuhn (1962) emphasizes the importance of understanding the text-book paradigms if one is to understand a science. OR/MS analysts seem to be taught two central paradigms: linear programming and queuing theory. Linear programming is the classic resource allocation model; crank in objectives, alternatives, production function and constraints and the optimal solution is found. Queuing theory (including simulation) deals with relationships between utilization and waiting times: build a model that behaves like the real system and test alternative policies for efficiency. Evaluation analysts seem to be taught one central paradigm: experimental design. Experimental design is an empirical device for statistically comparing the effects of an action (or treatment) against a control group in order to determine whether the action causes the desired results.

If the systems approach is in fact rapidly growing (as it appears to be) then any definition runs the risk of describing not the oak, but the acorn. But perhaps the systems approach is only new in name, not in function. Doesn't the Bible have insight to management and to dynamic feedback control (e.g., "When goods increase, they are increased that eat them..." Eccl. 5.11)? When has any organization tried to survive without information analysts (spys), policy advisors (astrologers, clergy-men), organization problem solvers (shamans), or any of the other roles played by todays analysts?

If it is legitimate to speak of a scientific community and of a managerial community, then the systems approach might be viewed as an effort by the scientific community to help the managerial community. In another time and place, the systems approach could be an effort by the religious community to help the managerial community. Or by the artistic community to help the scientific community. Or by any of the other permutations. The confidence scientists have that they can improve the management of social systems was probably equaled by the confidence religious leaders once had that they could improve the management of social systems.

Less abstract approaches to define the systems approach run into serious difficulties. For example, defining the systems approach as those activities that analysts say they do (or publish in journals) suffers from the well known defects, first that people, when describing their jobs, tend to emphasize the unusual aspects that account for only a small proportion of their time, and second that the selection of an analyst for questioning presupposes that the definition of the systems approach is already known. Even a sophisticated approach such as finding a differentiated cluster or pattern of activities that are characteristic of what analysts actually do is less than satisfactory because it would at best yield a static "snapshot" of a profession that is rapidly changing. White (1972) observes that "operations research and management science are social as well as technical phenomena...their definition cannot be separated from the social context in which these disciplines operate." The systems approach is itself a systems phenomena in that its definition cannot be separated from a teleological system description, a description

that can legitimately (and in fact does) take a variety of divergent forms.

2. Success: What is it?

One can legitimately investigate the success of systems approach methodologies, of analysts, of projects or groups. In a trivial sense, one could say that "success" depends on individual preferences. Thus an analyst whose sole objective is to have a high paying job might consider himself successful if he gets a good paycheck. However in a more meaning-ful sense, success depends on the effects the systems approach has on the social system.

Some analysts define success as improvements in information or in the decision making process within the organization (Mushkin, 1969). Other analysts are quick to point out the fallacy of assuming that "more rational" processes will automatically lead to better decisions (Lindblom, 1961).

There is widespread agreement that the mere publication of "a report is not a successful solution of an operational problem" (Morse, 1967). As an agent of change, the systems approach cannot be successful without implementation, although implementation certainly does not guarantee success.

A natural tendency is to define success as survival. Indeed, for the OR/MS manager, this may be an excellent operational definiton. How-ever, survival of an OR/MS group may entail such a great watering down of impact that the group is clearly not successful (Radnor, 1972).

Since many projects are by nature uncertain (who can guarantee creativity?), a distinction can be made between a good project and a

successful project. A good project is one that maximizes the probability of achieving improvements in the client system; a successful project is one that, for whatever reason, actually results in improving the client system. Economic theory suggests that organizations will tend to under-invest in uncertain investments, such as the systems approach, where the payoff cannot be appropriated by the investor (Scherer, 1965).

There is a significant controversy over the value of science in general. Is it mankind's savior or is it another horseman of the Apocalypse, heralding mankind's destruction? The President's Task Force on Science Policy (1970) says "this is a time of challenge and crises for science and technology." Forceful critics charge that science is a tool for the oppression of man by man (Marcuse, 1969). Meanwhile behaviorists openly call for a move "beyond freedom and dignity" (Skinner, 1971). Some analysts perceive a need for a reconciliation between the estranged disciplines of science and ethics (Brownowski, 1959).

Tansik has drawn attention to the impact of the project evaluation criteria on the analyst's conception of success (Tansik, 1970). Analysts who are in an environment that rewards publication (e.g., universities) will tend to include publication in their definition of success, while analysts in an environment that rewards implementation (e.g., governments) will tend to include implementation in their definition of success.

Radnor and his colleagues at Northwestern University emphasize the life cycle of an OR/MS group. OR/MS groups go through phases called 1) Pre-birth, 2) Introductory, 3) Transitional, 4) Maturity, and 5) Death (Tansik, 1970). Project success in the Pre-Birth phase might be defined quite differently than in the Maturity phase. There is evidence that

suggests that different types of analysts and different approaches might be called for in the different phases (White, 1971,2). "Integration" occurs when the OR/MS group becomes adjusted to and accepted by the rest of the organization.

If one accepts the premise that the systems approach can be viewed as a science of securing social improvement, then evaluating the success of a systems project will revolve around the issue of whether or not the social system is better off than it would have been without the project. The methods of experimental design might be useful for assessing project success (Suchman, 1967). However, the difficulty (impossibility?) of obtaining control groups will almost surely lead one to some form of "detectivism" in order to assess the project impact (Scriven, 1971).

Some useful literature is available on defining and measuring organizational effectiveness. This literature is especially pertinent since the systems approach should be concerned with its own effectiveness, which in turn is a function of the client organization's effectiveness.

Effectiveness measures, used here to refer to the measures of performance of the organization qua system, are what is sought when one defines success or conducts an evaluation. Although the fact is seldom appreciated by the layman, metrologists know that measurement itself can only occur as part of a teleological system (even in the case of elementary measures such as "length," Churchman, 1971). Ultimately, the validity of any measurement system must be judged by its usefulness (Kaplan, 1964).

The systems approach group is one component of a larger social system. Only if it were a separable component could one speak of its effectiveness without considering the effectiveness of the larger system. The problem

of defining the public interest has received substantial philosophic thought. Modern economists seem to have adopted (albeit implicitly) the philosophy of utilitarianism. But it is not at all clear that actual political decisions are based on utilitarianism, nor that they should be (Lindblom, 1968).

Since employees in the systems group are also part of the public, their interests should also be considered in defining the public interest. The recent history of industrial attempts to consider employee satisfaction has been summarized by Simon (1957):

> The early proponents of scientific management adopted a fairly narrow, almost physiological, point of view; emphasized short-run efficiency through specialization; and pretty well neglected the subtler motivational aspects of the problem -- including the satisfactions of the worker on the job. The early human relations research directed attention to the worker's job satisfactions and on the long-run feedback of these upon performance; it undoubtedly swung the pendulum too far in assuming that if job satisfactions were handled, efficiency would take care of itself. More recent studies...re-emphasize the short-run conflict between (efficiency and satisfaction).

A review of the literature yields the following dimensions of effectiveness that have been used or proposed for private or public organizations (Wasserman, 1959).

- survival
- productivity
- sales
- profitability
- flexibility
- growth
- worth of organization to members and society
- satisfaction
- prosperity
- market standing
- value added
- innovation
- absenteeism
- turnover
- grievance rates

- enlightenment
- integrity
- balance
- adaptability
- product quality
- absence of inter-group strain
- return on investment
- payout & plowback
- debt and interest
- product leadership
- personnel development
- plan fulfillment
- labor productivity
- costs per unit output
- economy of resources (waste)
- improvement

- apathy
- alienation
- immaturity
- resources
- management
- public responsibility
- employee & management
  attitudes
- time spent in internal
  communication
- balance between short-range
  & long-range goals

- morale
- reputation
- disciplinary actions
- acquiring resources
- maintenance
- sick leave
- investment in organization
- suggestions for improvement
- rationality
- conformity

These dimensions can be usefully grouped into the following three clusters that seem to define the most important aspects of organization effectiveness.

1) <u>Productivity</u> -- in the broader economic sense of achieving the most results possible with the available resources. Roughly synonomous with efficiency, profits, effectiveness, resource utilization, etc. A short-run criteria. In this sense, constitutes the primary emphasis of much program evaluation, PPBS, etc. It is the (intended) counterpart to "profits."

2) <u>Adaptability</u> -- the ability of an organization to adapt to a changing environment. Includes flexibility, innovation, responsiveness, etc. In a changing environment there is often a conflict between productivity (which requires high utilization) and adaptability (which requires organization slack).

3) <u>Satisfaction</u> -- the degree to which the organization facilitates (or does not hinder) personal growth and development of employees. Includes both satisfiers and dissatisfiers, but does not include measures that are solely instrumental for productivity or adaptability. Satisfaction measures are different for different people. For example, a person motivated by self-actualization needs will evaluate satisfaction with an organization quite differently than a person motivated by basic or safety needs.

Effectiveness measures are a potent force. People with a high achievement need will actively strive to achieve success as defined by the effectiveness measures (Blau, 1955). "To the extent you succeed in measuring effectiveness, you are implicitly setting standards of performance. And sooner or later, people and organizational units are going to be evaluated by these criteria" (Goldman, 1970).

3. Implementation: What is it?

In an article that stimulated a growing academic interest, Churchman and Schainblatt (1965) define implementation as "the manner in which the results of scientific effort may come to be used by the manager." This article, (which has been widely misunderstood), contains the germs of a serious challenge to a widely accepted identification of implementation with acceptance and/or utilization of recommendations. Implementation, it is argued, is a concept that means quite different things depending on one's view of the nature of the systems approach and of the organizational relationship between analyst and manager. This article was followed by a series of ten lively commentaries (Churchman and Schainblatt, 1965,2). Together, the article and the commentaries form a useful starting point for reading about implementation.

Radnor, Rubenstein and Tansik (1970) suggest that implementation can be considered from three viewpoints: 1) as a transition between successive stages in a work flow; 2) as a special case of organizational change or adaptation; or 3) as a continuous process along all phases of a project. Implementation of a project is distinguished from integration of systems approach activities in the organization.

Collcutt and Reader (1967) introduce a novel application of a logistic growth curve to measure effectiveness of projects. This approach introduces the time dimension. A project is presumably implemented only to the extent that the improvements occur before they would have occurred in the absence of the project.

Bennis (1965) defines implementation as "a process which includes the creation of understanding and commitment toward a particular change and devices whereby it can become integral to the client system's operations." He distinguishes implementation from acceptance (i.e., manager "buys" proposal even though he may not understand it) and from adoption (i.e., manager "internalizes" proposal as his own idea).

Ratoosh, who with Churchman carried out some laboratory experiments on implementation, defines implementation as "a class of behaviours designed to increase the likelihood that an organization will accept a research finding that, in the opinion of the research group, constitutes a solution of an operations problem or at least constitutes a policy superior to the one currently in use by the organization" (Ratoosh, 1966). The experiments consisted in playing a computerized business game in which each management team had a "confederate" who knew the optimal solution. The confederate's objective was to get the management team to implement the optimal solution. Ratoosh reports that "it turned out that the solution was rarely adopted, and even in those cases in which it was, the adoption appeared to result from a blind yielding to pressure from the confederate."

The Tavistock Institute emphasizes the inadequacy of technical models that neglect the social needs of the organization members. The

coal mining study (case C above) is an example where implementation was carried out pro forma but improvement was thwarted until the informal organization was taken into account (Trist, 1951).

The growing literature on organizational change and organizational development tends to view implementation as the process of changing a system and stabilizing it in its new state. In order to implement a recommendation that changes the behavior of members of some sub-system, that sub-system must have already been designed so that it is capable of change, i.e., it must already be an adaptive-coping system. Schein (1965) describes the nature of adaptive-coping systems and the cycle that change must go through.

Implementation can also be viewed as a marketing activity. After reading a number of reports prepared for managers, it is easy to recognize that the packaging is frequently bad. A scientifically written report seems to be a poor medium for initiating change. Managers simply don't have the time to read written reports. They are accustomed to responding to verbal and visual presentations (Mintzberg, 1971). Hovland and others have conducted rigorous studies on the effectiveness of different presentation strategies (Hovland, 1957).

The word "implementation" with its connotations of fulfilling the analyst's intentions and/or utilizing his recommendations, no longer even applies to many activities of the analyst. For example, an analyst may be asked to develop an estimate of the number of houses with lead paint on the interior walls. It clearly does not make sense to ask if the estimates were implemented. The time may soon come when analysts stop talking about "implementation" and begin talking about "effectiveness." The real concern is with improving effectiveness.

In spite of the definitional difficulties, many practitioners have had the unpleasant experience of conducting a "good" study and making "good" recommendations that they "know" will make substantial improvements and yet finding their report falling on the deaf ears of management. The analyst is not told why the report is rejected (perhaps the manager doesn't really know) and the analyst can't seem to figure it out for himself. The data checks out. The models check out. Why weren't the recommendations implemented? To understand implementation, perhaps one should first try to understand the emotional frustration that results from this situation.

Any theory of implementation is expected to cover a wide range of situations. The seven cases described in Section I illustrate the diversity. In the first six cases management accepted the recommendations. Case A failed because there was no "product champion" to push for implementation. Case B failed because the problems of transition from the old system to the new system were not dealt with. Case C failed because the new system undermined the existing informal social system and damaged worker morale. Case D failed because the research findings were not translated into action recommendations. Case E failed because of an erroneous assumption that the population perceived the problem in the same way as the analyst, and a disregard of other incentives facing the population. Case F failed because the organization was unable to obtain the required new resources. And the final case, G, failed because management rejected the recommendations.

4. Implementation: How is it achieved?

Two years ago, Harvey (1970) could write: "Despite the persistence of the problem (implementation) and its increasing importance, there has

been little hard-fast research on either causes or cures." Since then, a number of dissertations, theses, books, articles, and speeches have been published on the problem of implementation (but we still don't know the causes and cures nor, perhaps, even how to define the problem).

Based on the ongoing research at Northwestern, (primarily field surveys), Rubenstein identifies the following factors relevant to the effectiveness of an OR/MS group (Rubenstein, et. al., 1967):

- level of management support
- client receptivity
- organizational and technical capability of OR group
- organization location
- influence
- reputation
- adequacy of resources
- relevance of projects
- level of opposition
- general perception of level of success

He also lists the following factors that were found in a literature search:

- management understanding
- working relations with management
- measurable project savings
- project urgency
- relevance of techniques

Radnor, Rubenstein and Tansik (1970) identify three types of variables that appear to be of key importance:

- the nature of the client-researcher relation
- the level and type of top-management support for the research activity

- the type of organizational and external environment in which the research activity is pursued

Harvey (1970) obtained ratings from a panel of "expert" analysts on the importance of variables thought to influence management's decision to implement. The variables rated most influential were:

- does management have experience of previous success with sophisticated approaches to problem solving?

- is management future oriented?

- is management sensitive to environment change and its requirements?

- is climate favorable to innovation?

- is the importance of inter-relationships between activities appreciated?

- does management identify problem area as of major importance?

- does analyst accepted responsibility for achieving successful implementation?

For a long time it has been held that any innovation is foreign to the mechanical, efficient machinery of a bureaucracy (von Mises, 1944). Since a climate unfavorable to innovation may also be unfavorable to the systems approach, one can look to the literature on innovation to seek ways to improve implementation. Organizations with high visibility of program results and low activity control seem most favorable for innovation (Rosner, 1968).

Downs (1966) has presented a list of organization policies that tend to extend the search for alternatives:

- extend time before conclusions required

- increase variety of interests (even conflicting) of people in decision making process

- reduce number of persons who must approve final decision

- increase number of analytical people in process

- isolate decision makers from pressure of responsibility for other decisions

- reduce number of busy people who must approve final decision.

Cushen (1972) identifies the following environmental factors that have prevented implementation of textbook solutions in government:

- there is no _single_ decision maker in government

- there is no _single_ objective

- efficiency is often not important

- most public organizations have a personality-oriented management style

- there is often an incentive to maintain ambiguity in order to preserve freedom of action

- most classroom assumptions do not hold

- facts are rarely "given" -- many have been assembled for the purpose of reward and punishment rather than for analysis

- incentives in government do not encourage experiment; failures are generally covered up

- managers don't know what they want to do with the scientific techniques

- managers are more interested in imaginative alternatives (bright ideas) than in methodical analysis.

Suchman (1967) identifies the following situations where there is no intention to make use of the evaluation study and where, as a result, it would be very unlikely for implementation to occur no matter what the analyst does.

- Eye-wash (selecting only those program aspects that "look good")

- White-wash (cover up program failure by avoiding objective appraisal...solicit "testimonials")

- Submarine (attempt to get rid of program -- sink opponents along with their program)

· Posture ("gesture" of objectivity to look good to public)

· Postponement (delay action by seeking the "facts")

· Substitution (disguise failure in some part of program by
shifting attention to less relevant aspects)

Good analysts will attempt to ascertain the "hidden agenda" of study sponsors and will try not to accept study requests in the above categories where there is little chance of implementation or of improving the program (Suchman, 1972).

Huysmans (1970) examined the effects of managerial cognitive style on implementation problems through computerized gaming experiments. He suggests that in addition to cognitive style other important factors are communication of recommendations and the impact of the recommendations on the user's goals.

Manley (1971) adopted an innovative approach for studying implementation. He used teachers in a school district to test various implementation strategies -- the teachers thought they were responding to actual plans that were being considered by district management. Taking an approach based on theories of organizational behavior and resistance to change, he emphasizes the need to consider three groups. Implementation may be blocked 1) by the analyst, 2) by the managers, or 3) by the people who will actually be affected by the change.

Tansik (1970) uses a questionnaire survey to investigate the effects of the criteria used to evaluate the analyst and the manager on implementation. Congruence in evaluation criteria (i.e., both analyst and manager are after the same thing) improves the chances of implementation. Tansik points out that using implementation as a criteria for the evaluation of analysts creates a potential problem of having "uncontrolled evaluations" (Scott, 1967).

Implementation may be viewed as a problem in line-staff relations. Koontz and O'Donnell (1959), speaking of line-staff relations, state: "There is probably no other single area of management which in practice causes more difficulties." After studying two concepts of line-staff relations, the Neutral and Inferior Instrument (NII) and the Collegue models, Golembiewski (1966) states: "Globally, the results do not encourage a deep commitment to the NII model (i.e., the analyst "serves" the manager who is superior) by either practitioner or student."

Shakun (1968), after studying OR through a cross cultural comparison, concludes that a key factor for implementation is social in character; "scientific method (must) be accepted intuitively as part of the way of life."

Bennis (1965) says implementation depends on:

- client's understanding of the change, his influence in controlling the fate of the change, and his trust in the initiator of the change

- client's perception of change as self-motivated and voluntary

- change program's content of emotional value as well as cognitive elements

- congruence of change agent with the recommendations and relations with client

Ackoff (1960) presents the following caveats:

- never sign a contract you cannot break

- never report to anyone too low

- never report through intermediaries

- never perform research for anyone at no cost to him.

Schon (1970) emphasizes the importance of resistance to change but points out that resistance is an attribute not of the individual but of the system itself.

Psychological research offers valuable insights to decision theory. Oshikawa (1969) presents an analysis and experimental test of cognitive dissonance and Lewinian theories. Cognitive dissonance theory (Brehm and Cohen, 1962) has been useful in understanding consumer behavior. Dissonance, which results from any decision where one rejects an attractive alternative, produces tension which must be relieved. For example, following a close decision to buy a Ford or a Chevrolet, the new Ford owner will often build up a "case" why the Ford was really the best after all. (It might be interesting to explore whether or not studies that are commissioned to justify a given decision actually do serve a useful function of reducing cognitive dissonance.)

Another productive area to find insights on implementation is in the literature on R&D management. Starting in 1962, M.I.T.'s Sloan School of Management undertook a major research program on the organization and management of technology-based enterprises. Some of their more interesting results that are relevant to implementation are the following (Marquis, 1967):

- successful managers of new venture enterprises (similar to evaluation groups) tend to be young entrepreneurs with high education and strong achievement drive

- success of projects is associated with the safety factor (margin for error) in the plan, the amount of work subcontracted, and the ability of the project manager. "A successful project manager possesses most of the personality traits and characteristics of a good top executive or general manager"

- the extent of interactions between team members is unrelated to performance, but the extent of interactions with individuals outside the project team is positively related to performance

- the informal contacts between the contract awarding organization and the award recipient are the key determinants both of the award itself and of the terms of the contract. It was possible to predict the contract award recipient prior to the issuance of the RFP in about 90% (sic) of the cases studied

• although there was no one recommended style of supervision for all groups, it does appear that "the most productive scientists and the most productive groups (in terms of papers) felt more freedom to choose their work, were more likely to work beyond regular hours, and felt less influence from the overall laboratory mission...The amount of technical contact with the supervisor was positively related to group effectiveness, while informal social contact was negatively related."

Torrey (1972) has written a book that surely has a message for implementation strategy. He studied witch doctors and found that they are quite effective in their cultures and in fact use mechanisms for curing patients that are similar to those used by western therapists. There are four common mechanisms that make the therapist and witch doctor, and perhaps also the systems analyst, an effective change agent for a purposive organism. Torrey describes these mechanisms as follows:

1. The "Principle of Rumplestiltskin." The act of naming the client's problem conveys that a man of considerable status understands, and since it can be understood, it presumably can be cured. "In order to know the right name the therapist must share some of the patient's world view."

2. The Effective Personality. It is not the cognitive ability or cookbook recipes that make an analyst effective. Rather it is an entire set of cues that he emits that convey 1) genuineness, 2) accurate empathy, and 3) nonpossessive warmth.

3. Raising Expectations. Analysts all over the world use many ways to raise the expectations of their patients. The first way is the trip itself to the analyst -- the pilgrimage. The farther a person goes or the more he pays to be healed, the greater are the chances that he will be healed.

4. Use of Scientific Techniques. Whether it is drugs or rituals or training, all analysts rely heavily on empirically derived and tested techniques to produce desired responses.

It appears that much of the literature proceeds on the implicit assumption that the problem is to learn how to predict implementation success or failure given knowledge of system state variables. The ideal result would presumably be a functional equation of the form $S = f(X)$, where S is the measure of success and X is a vector that measures the relevant variables that influence success. At the risk of heresy, one might reflect on whether or not the equation $S = f(X)$, if ever found, would be of value to a manager. What would he do with that information? It certainly would be interesting reading. But can the manager hand it to a new analyst and feel confident that he now understands how to implement? Perhaps the problem of implementation should be approached, not by filling in the equation $S = f(X)$, but rather (or also) by exploring the type of organization that is required for analysts to be able to learn how to achieve implementation in the sense that one learns how to drive a car.

III. ALTERNATIVE WORLD VIEWS

This section outlines several different world views (or conceptions) of the systems approach that seem to be feasible yet lead to different notions of success and of implementation. The reader is invited to use the following simple methodology to think through his own view of the systems approach (or evaluation) prior to reading this section.

First compile a list of various occupational roles. Then, for each occupation, describe the nature of a system in which the analyst's role would be most similar to the given occupational role. (This, of course, is at best a method of discovery, not a method of proof.)

Following is a list of occupations that can be examined.

Anthropologist	Engineer	Physician
Architect	Forester	Policeman
Astrologer	Historian	Psychiatrist
Botanist	Lawyer	Reporter
Clergyman	Librarian	Staff Assistant
Coach	Meteorologist	Writer

Using this method as a guide, it is possible to identify at least five apparently distinct world views or conceptions of what the analyst system should be. Each of these world views has its own advocates. (Three of these world views are discernable in a recent discussion in Interfaces, Halbrecht, 1972.) These five views are described in the following paragraphs in alphabetical order.

1. Analyst as Anthropologist

Popular in some sectors of the academic community, this view considers the primary objective of the systems approach to be the

understanding and description of the culture of management (or of some portion). Activities such as the assignment and rotation of analysts would be on the basis of what is most needed for developing their skills and for contributing to the knowledge pool. Government organizations would be a laboratory for gathering observations and for testing theories.

Measures of success for this system might be articles published (both quantity and quality), research conducted, and knowledge break-throughs. The client of this system is the analyst. He allocates his time with the objective of his own self development. He must continuously select problems to work on and approaches to use, e.g., whether to take observations or to study theory. An important spin off of this system would be that the analyst becomes an expert in management theory and can take interim breaks to serve as an expert advisor to management.

The advocate of this system is the pure scientist. He can make a very convincing case for his position, however, he is fighting a very difficult opponent. The "opponent" is the extreme difficulty of financing research that is not judged "relevant" to the immediate problems perceived by management.

This system is similar to the "separate function" position described by Churchman and Schainblatt (1965). It offers a number of potential advantages. There is less chance for the analyst to become "bureaucratized" or diverted into non-productive activities such as "fire-fighting" or justifying decisions that have already been taken. There is greater exchange of knowledge since publishing becomes an important incentive. And there may be greater chance for long range improvement in social systems since scientific independence is a proven method of advancing knowledge.

2. Analyst as Coach

This position, found among some educators and management consultants, views the objective of the systems approach as teaching the manager how to perform better. The measure of performance is the improvement in the manager's performance. The analyst, who may be an ex-manager, attempts to educate the manager by providing exercises or learning experiences much as an atheletic coach guides the athelete to improved performance.

The major decisions in this system concern what is the best way to educate the manager? It may be in college (e.g., MBA programs), it may be in post-graduate courses for managers, or it may be through helping the manager work through some actual problems. The client and the decision maker in this system are both the manager.

This position, similar to the "communication position" of Churchman and Schainblatt (1965), does not suffer from the conflict of interest between the client and decision maker that was present in the Analyst-as-Anthropologist position. However, Analyst-as-Coach faces the serious problem that managers do not currently perceive analysts as being expert managers (and most analysts are not). Nor do most managers believe that they could improve their managing if they invested the tremendous effort required to learn the scientific techniques of the analyst.

However, adherents of this position also present a convincing case. There is certainly a market for MBA programs in the Universities and for organization development programs in industry and government. Teaching the manager how to solve a problem not only solves the problem at hand, it also leaves the manager as a more effective problem solver. This gives the analyst more leverage (and thus more effectiveness) than if he

simply solves the problems himself. Furthermore, historical analysis or analysis of under-developed countries confirms the importance of developing effective managers if science is to contribute anything.

3. Analyst as Librarian

This view focuses on the organization decision making process. The role of the analyst is to provide the decision maker with digested information for making better decisions. Measures of performance might be relevancy, completeness, reliability and timeliness of information. Other measures might be innovative ideas suggested, satisfaction of the manager and improved decisions. The value of the analyst to the manager will be related to how well he can answer questions. The manager is again both client and decision maker.

The analyst, like a highly sophisticated librarian, performs information search, retrieval and consolidation, either on request of the manager or in anticipation of the manager's future needs.

This world view exhibits a move away from the conception of the systems approach as a scientific enterprise. The analyst-as-librarian is definitely bureaucratized and although he may maintain communication lines to the scientific community he is no longer an active participant. There is probably an excellent market for the analyst-as-librarian in government agencies.

Advocates of this position present a strong case that the other positions are unrealistic or quixotic. Analyst-as-librarian, they argue, is the only feasible approach under our current political and administrative system.

4. Analyst as Physician

This world view conceives the objective of the systems approach to be to help organizations to adjust to changing environments and to solve problems much as a physician helps individuals solve health problems. The measure of performance of the system is the number and difficulty of problems solved. The analyst is an expert in problems and dysfunctions of organizations and their solution. Although similar to Analyst-as-Coach, Analyst-as-Physician concentrates on the problem and the policy instead of on the manager. The client is the manager, but the decision maker is both the analyst who prescribes and the manager who utilizes.

This position is similar to that termed "persuasion" by Churchman and Schainblatt (1965). The analyst uses his scientific knowledge and techniques to diagnose the client's presenting symptoms, to discover the true causes and to prescribe a remedy that can solve the problem. The analyst's understanding of the problem, gained through extensive scientific inquiry, is superior to that of the manager (who has not devoted much time to study it). The analyst should explain to the manager the benefits of his recommendations.

Adherents of this view probably comprise the majority of professionally-oriented analysts working in government. The "implementation problem," as discussed in the literature, often makes sense only when understood from this world view. Its adherents also present a very strong case. Analyst-as-Physician is said to be the best way to direct and focus the capabilities of the scientific community on current social and organizational problems.

5. Analyst as Staff Assistant

This world view, like Analyst-as-Librarian, places the analyst in more of a bureaucratic role than a professional role. This is the view that many inexperienced managers think they prefer. The objective of this system is to assist the manager by performing delegated work. The analyst acts as the manager's *alter ego* in dealing with some, perhaps technical, issues. The measure of performance of this system is strictly manager satisfaction. In practice, this typically means three sub-criteria: 1) controllability; 2) timeliness; and 3) confidentiality. The manager is both client and decision maker.

Of the five world views described, this is the only one that seems to have no merit. Yet it has adherents. It seems to be a product of an orientation that emphasizes activities rather than results, predictability rather than innovation, and stability rather than change. However, this world view is not even in the interest of its adherents who, like children who fear the doctor's hypodermic needle, mistakenly conclude that they can enjoy the benefits of the systems approach (the immunity from the disease) without accepting the necessary inconveniences (getting the shot).

The issue of implementation of the systems approach can be better understood if one recognizes that different people hold different world views of the nature of the analyst system. Five apparently different world views have been identified for which one can establish, (with one possible exception), a reasonable case for their validity. Each of these world views assumes the systems approach is beneficial although each has different measures of success. A sixth world view, which might be called Analyst-as-Policeman, has been intentionally omitted. This view, which

might be the "deadliest enemy" of the world view held by the reader, assumes that the systems approach is harmful and will be used to further centralize power and deprive man of freedom. One characteristic of different world views seems to be that no amount of analysis can conclusively identify the best. We are left without a resolution.

The following section presents an untested and somewhat speculative paradigm of a systems project that may be of interest to those readers who are managing an analyst group and thus are forced to act even in the absence of firm knowledge.

IV. A CONCEPTUAL MODEL

This paper, a Baedeker to a complex literature, has of necessity been highly condensed. However, by now the reader may be feeling a sense of frustration and despair. He may wonder what he would have to gain from tackling the voluminous, fragmented, and incomplete literature; a literature that apparently has no simple answer to his real need to know what it is that he can do to improve implementation. This reader should be optimistic; the very fact that he is concerned enough about implementation to feel some frustration gives him an advantage that some of his predecessors, (those who had assumed that implementation would occur automatically), did not have.

But of course it is not enough to be optimistic, one must also act. Therefore it seems appropriate to present a conceptual model (or paradigm) of a systems project and some related conclusions and recommendations even though they are speculative. In doing this, my own bias will become apparent. Specifically, I have a strong bias towards the Analyst-as-Physician world view, I tend to be impatient with efforts at comprehensiveness, and I usually assume that complexity is merely a sign of inadequate knowledge. Having confessed these biases and being motivated not by expertise but by necessity, I will proceed to develop a paradigm of project implementation.

Systems Approach Project

I will begin by defining a systems approach project as a coordinated, purposeful system of activities designed to improve the effectiveness of an external organization. Of course we are often interested primarily in scientific activities, but projects may and do include any kind of activity that can improve the client organization (e.g., a physician may help a patient by prescribing a placebo). All of the activities that comprise the project are assumed to be outside the normal work process of the organization, however they may be performed all or in part by persons who are employees of the client organization. Thus persons conducting the project are always in the role of "outsiders" (even if a person evaluates himself, he must first "step outside" himself).

This way of defining a project immediately focuses on the similarities between a project and an organization (e.g., Barnard defines a formal organization as a system of consciously coordinated activities of two or more persons). Once we recognize this similarity it is easy to see that the problem of the implementation of recommendations in the external organization is equivalent to the problem of managing the systems approach project.

Since our concern is with the management of the project we must abandon (or at least be sceptical of) attempts to find cook-book recipes for success. Good managing goes beyond intellectual methods. A good manager must employ qualities such as "good judgement," "feeling," "intuition" and "common sense." It is safe to assume that at any moment in time, almost all people are poor managers. It takes aptitude plus a favorable learning environment (i.e., experience) over a sufficient time period to develop a good project manager.

The activities in a systems approach project may be grouped into the following five major components:

- Selection
- Inquiry
- Persuasion
- Feedback
- General management

I believe that these five components may be the most important and probably the necessary pre-requisites to success of a systems project. In the following paragraphs I will describe each component by presenting an "ideal" set of guidelines for a systems project. Although these guidelines are unproven, they can be of definite help to prevent some of the more common errors of omission that result in "shelved" reports.

1. Project Selection

The first component is Selection of the project. There are three parts to Selection: 1) client selection; 2) problem selection; and 3) analyst selection. Selection is probably by far the most critical element for project success, yet it is almost universally neglected. Selection is often done before the project manager is called in. In the medical analogy, it is often as if the patient decides when and what kind of an operation he wants before he consults the physician. The best performed appendectomy in the world will not improve the health of someone who actually needed a kidney transplant. There seems to be three approaches to follow, given the current situation where projects are generated in the external organization. The first approach is to provide "education" to probable project initiators in order to enable them to

recognize situations where a systems approach project can be beneficial. The second approach is to carefully screen each project request in order to determine whether or not the project might improve the client organization's effectiveness (i.e., perform an "issue study"). In the medical analogy, an example of former activity is mass media advertising of warning signs of cancer, and an example of the latter activity is diagnosis of the presenting symptoms. The third approach is to screen each project request (after the issue study) in order to determine whether or not the client organization would be willing and able to implement the possible recommendations from the study (i.e., perform a "contingency analysis"). In the medical analogy, an example of this activity would be determining if the patient had any allergic reactions to antibiotics.

The criteria for project Selection must be adjusted to the individual situation. The relationship of the project to other projects and to analyst capabilities, preferences, and availability must be considered in addition to the expected benefits and costs. The degree of risk (of failure) that should be accepted depends on the position of the analyst group (its organizational power and prestige) and its project portfolio. Early successes are usually important for establishing the legitimacy and credibility of the systems approach. Some common errors in the Selection component are the following:

- Failure to perform an issue study and a contingency analysis (e.g., not asking what the decision makers can do with the project results until after the project is completed or underway).

- Routinizing the issue study and contingency analysis (e.g., developing a standard format and assigning to junior analyst).

- Accepting projects that have no possibility of a significant
  payback (e.g., an inventory control system for paper clips).

- Accepting projects that have no possibility of being implemented
  (e.g., when client does not have the ability to make the change).

- Failure to consider social and organizational equity issues
  (e.g., the organizational effects of the redistribution of status
  and the centralization of authority entailed in a computerized
  information system).

The Selection component may be summarized by three fundamental
questions:

1. How will you see that you receive good project requests?

2. How will you avoid accepting projects that are not likely
   to have solutions?

3. How will you avoid accepting projects that are not likely
   to have any solution implemented?

2. Inquiry

The second component of the project is Inquiry. Inquiry is the
process by which the analyst discovers the solution to the problem.
Inquiry is a creative and innovative process about which we (I) know
very little. Inquiry is not the scientific method as exhibited in texts
and journals. It is a serious, albeit common error for the project
manager to assume that a scientific method (such as experimental design)
will automatically lead to the discovery of a solution. It will not!
What we usually see published in journals and reports is not what the
analyst used for inquiry (or discovery), but rather it is what he is
using for persuasion (cf. Kaplan's distinction between a logic-in-use
and a logic of reconstruction). Inquiry cannot usually be planned in
detail. It is probably best viewed as a process of trial and error that
resembles a random walk. Each analyst must develop his own style of

inquiry, and be able to adjust his employment of sense data (empirical observation), thought processes (rational models), feeling, and intuition to the particular problem. There will often be a recycling as the analyst gives progressively better formulations to the problem. Some common errors in the Inquiry component are the following:

- Failure to recognize the creative, uncertain nature of inquiry or confusing inquiry with the scientific method (e.g., adopting a detailed, tight work plan before the general line of the solution has been worked out).

- Allocating an excessive amount of time to preliminary empirical observation before thinking about the problem (e.g., in "documenting the existing system" by extensive flow charting of the organization's decision processes).

- Failure to consider the ability of the client organization to manage a transition and stabilization of the proposed change (e.g., grossly underestimating the economic and political costs of making the change).

- Failure to accurately assess and consider the interests of all persons affected by the change (e.g., neglecting to consider impact on the informal organization).

The Inquiry component may be summarized by three fundamental questions:

4. How will you create incentives for the analysts that will lead to a problem solution?

5. How will you identify the perspectives and interests of all the affected parties?

6. How will you ensure that costs of transition and stabilization are considered?

3. Persuasion

The third component of the project is Persuasion. The objective of this component is to enable the decision makers to discover the

solution through their own process of inquiry. In other words, the component Persuasion is identical to the component of Inquiry except that instead of conducting inquiry, the analyst creates an environment for the relevant decision makers to conduct their own inquiry. Naturally this means that the Persuasion component, (which is usually the major effort of the project and includes 1) project planning, 2) project execution and 3) presentations), must be geared to whatever method of inquiry best suits the decision makers (not the analyst). If the decision makers are scientists or rely on scientific criteria, then a scientific method is appropriate. If the decision makers rely on intuition, then a method of presenting direct experience is appropriate. Or if the decision makers limit their inquiry to orders from their superiors, then a method of direct order is appropriate.

Many otherwise excellent studies that indeed identify excellent solutions fail to be implemented simply because of a mistaken assumption that the decision maker is the same kind of inquiring system as the analyst. If this component fails, the whole project fails. In contrast, the component of Inquiry may fail or even be omitted and the project may still succeed. In other words, the analyst may never discover a solution yet the project will still succeed if he can create an environment where the relevant decision makers discover their own solution. (Of course the reason Inquiry is so important is that when the analyst knows a solution it is much easier to create an environment for productive inquiry by the decision makers.)

In both this and the preceding component, you will never find a solution that is 100% certain to work. Both the analyst and the manager must take risks. The confidence you should seek in proposed solutions

depends on factors such as the cost of increasing the confidence and the costs and benefits associated with success and with failure of the solution.

Note that this way of looking at the Persuasion component greatly de-emphasizes selling. Yet it seems that many successful project managers end up thinking that selling is half their job (and nursemaid the other half). For example, if your recommendation to an organization is operational in other organizations you can appeal to the client's desire to get on the bandwagon, or if your recommendation has never been tried before you can appeal to the client's desire to be a leader. But left unchecked, selling tends to backfire when the product sold doesn't meet the client's expectations. Furthermore the analyst who thinks implementation is merely a problem of selling his idea often comes to think he is superior to the client -- this creates a vicious circle since the client resents the analyst's air of superiority therefore rejects his recommendations which in turn reinforces the analyst's belief that the client is stupid. The analyst who overemphasizes selling thus seems to risk becoming cynical (if he is a good salesman), or ineffectual (if he is a bad salesman), neither of which characteristics contribute to good analysis.

Note also that the entire model, and especially the Persuasion component, intentionally de-emphasizes the role of analysis in the advesary process. Yet no intelligent public official would today jump into the policy arena without "getting his ducks lined up" and he needs analysts to do this for him. However these analysts are functioning in a different role (Librarian) with different objectives and different

measures of success than those of concern here (i.e., the Analyst-as-Physician).

Some common errors in the Persuasion component are the following:

- Assumption that decision maker is the same kind of inquiring system as the analyst (e.g., handing manager a scientifically written report).

- Failure to generate and maintain motivation and interest in decision makers (e.g., not obtaining client participation until project is completed).

- Inadequate project planning (e.g., repeatedly missing target checkpoints).

- Assumption that persuasion is not the analyst's responsibility, or that persuasion simply means "selling" the analyst's solution (rather than creating an environment for the decision maker to discover his own solution).

- Poor verbal presentation (e.g., inadequate visual aids).

The Persuasion component may be summarized by four fundamental questions:

7. How will you plan the project?

8. How will you see that the decision makers discover the (or "a") solution?

9. How will you create ability (e.g., new skills) for required decision makers to modify their behavior?

10. How will you create incentives for required decision makers to modify their behavior?

4. Feedback

The fourth component of the project is Feedback. Every project should be a learning experience for both the analysts and the managers. Yet unless active countermeasures are taken, there seems to be a tendency

for feedback (communication) to be avoided as if it were equivalent to consorting with the enemy. The objective of this component is to create a project environment that facilitates the development of mutual understanding, i.e., the analysts learn more about the managers, (e.g., their needs, their capabilities and their organization), and the managers learn more about the analysts.

There are two aspects of feedback. The first aspect is feedback concerned with the success of future projects. This aspect is concerned with developing communication lines, information networks, prestige and "political capital." The second aspect (and the only one that will be discussed here) concerns the success of the present project. This aspect is concerned with developing sufficient mutual understanding to promote project success.

One frequently prescribed method of feedback is to obtain management participation throughout the study. Participation has been interpreted as anything from receiving progress reports to full time membership on the study team (e.g., one analyst shop has a rule of thumb that the client organization should match the analyst hours on a one to one basis). But the important thing is not the fact of participation but the resulting feedback. The feedback introduces a dynamic aspect to the components of Selection, Inquiry and Persuasion; the study team recycles through these components until a satisfactory problem definition and corresponding solution is developed. It is the recycling that is important for success, not the participation. (There are a number of other advantages to participation such as the fact of making an early commitment to a project makes it more difficult for a manager to subsequently oppose it. However these advantages seem to be counterbalanced

by equal disadvantages such as the fact that management participation tends to narrow the range of alternatives that will be considered.)

Implementing a change in an organization is in some ways like performing a heart transplant. The change of itself seems to generate forces (antibodies) that tend to reject or neutralize the change. Thus another function of feedback is to identify these forces as they emerge so that they can be neutralized before they neutralize the change. This means that the systems project should not be terminated until the implemented change becomes viable and stabilized.

Some common errors in the Feedback component are the following:

· Failure to create an atmosphere of trust and acceptance that will make feedback possible (e.g., an organization that rewards the analyst for reporting the manager's errors while rewarding the manager for concealing his errors).

· Failure to provide for the recycling of the other components in response to feedback (e.g., an architect who designs an entire house before getting his client's reaction to preliminary sketches).

· Failure to evaluate the project in order to learn from past mistakes.

· Failure to ensure that an implemented change has been stabilized.

· Assumption that management participation is always desirable and will automatically provide satisfactory feedback.

The Feedback component may be summarized by four fundamental questions:

11. How will you create an atmosphere for feedback?

12. How will you ensure satisfactory recycling occurs in response to feedback?

13. How will you see that performance on subsequent projects is improved as a result of experience on this project?

14. How will you see that the implemented change is not subsequently neutralized?

5. General Management

The approach we are taking in defining a systems project and its components enables us to observe the symptom of poor implementation through the lenses of organization theories. Implementation, in other words, is not a problem of marketing a product (the analyst's recommendation) but rather it is a problem of managing an organization (the systems project). My intention in adopting this approach is to explicitly exclude the implicit assumption that a failure to implement implies insufficient ability to coerce people to change their behavior. Instead of asking about the selling strategy (e.g., propaganda), the systems manager should first be asking whether a good project was selected and whether or not the analyst's solution was in fact in the best interests of the relevant parties.

Viewing a systems project as an organization makes it apparent that it is very decentralized, uncoordinated and fragmented -- indeed more like a market place than a bureaucracy. The project manager has little control over activities in the client organization and managers in the client organization have little control over analyst activities (control requires knowledge). Yet both activities in the client organization and in the analyst organization are necessary and must be coordinated for success. Management of a systems project is also complicated by conflicting value systems, e.g., when the client organization is a bureaucracy that values certainty, confidentiality, and controllability while the analyst organization is a profession that values innovation, integrity and independence.

There are numerous styles of management and it might be impossible to make any general statements about the best way to manage a systems

project. But if this way of looking at a systems project (i.e., as an organization) is valid then there are some important implications. For example a systems project (since it is an organization) probably needs a name and an image. An informal organization centered around the systems project will probably emerge. And there will be a tendency for the successful system project to shift to survival goals and attempt to perpetuate itself. Such implications seem testable but until they are tested this way of viewing a systems project can profitably be adopted as a working hypothesis if it makes intuitive sense to the reader.

In closing we might explore some implications for the project manager's behavior of adopting this view of a systems project. A major competing view is the "build a better mousetrap" theory. If you adopt the mousetrap view, you will probably ignore everything we have discussed except the inquiry component. You will think it is your job to invent and someone elses job to buy or sell your invention. You may think of implementation as a process of diffusion. In contrast, the view presented in this document implies that the mousetrap view will generally fail unless someone else takes care of the other activities (e.g., in addition to the production) that are needed to make any organization successful. If you adopt the view presented here, you will be asking questions about project organization, control, communications and incentives. You will be concerned with marketing as well as production; with morale as well as efficiency; with Barnard as well as Dantzig.

This paper found little progress in the literature in solving the problem of implementation. Writers have divergent (often implicit) views about the nature and role of analysis and of analysts. The reason

so little progress has been made in understanding implementation may be that the discussions are based on unsatisfactory assumptions. A different set of assumptions is proposed. A project is defined as a set of activities similar to a formal organization and the "problem of implementation" is redefined as the problem of managing the project. The next logical step in the use of this view (or model) would seem to be elaboration and refinement followed by an application to describe past projects. If the model can be kept consistent and if it satisfactorily explains case studies of systems projects, then an attempt can be made to extend it to develop and then test some key propositions (analogues from organization theory). Finally, if the model still appears valid, we may safely conclude that the problem of "implementation" was a red herring that diverted our attention towards salesmanship and away from the real problem of improving project "effectiveness" through better project management.

V. BIBLIOGRAPHY

(This bibliography is in draft form;
some of the citations are incomplete.)

Abel, T., "Verstehen," American Journal of Sociology, 54, (1948-
1949), pp. 211-218.

Abrams, John W., "Commentary on 'The Researcher and the Manager:
A Dialectic of Implementation,'" Management Science, XII
(October, 1965), pp. B3-B5.

_____, "Implementation of Operational Research: A Problem
in Sociology," Canadian Operations Research Society Journal, III
(November, 1965), pp. 150-160.

Ackoff, Russell L., "Some Unsolved Problems in Problem-Solving,"
Operational Research Quarterly, Vol. 13 (1962), pp. 1-11.

_____, "Unsuccessful Case Studies and Why," Operations
Research, VIII (March, 1960), pp. 259-263.

_____ and P. Rivett, A Manager's Guide to Operations
Research (New York: John Wiley and Sons, Inc., 1963).

_____ and Maurice W. Sasieni, Fundamentals of Operations
Research (New York: Wiley, 1968).

_____, "A Black Ghetto's Research on a University,"
Operations Research, (Sept.-Oct., 1970), pp. 761-771.

Alderson, Wroe, "Researcher and Manager: Commentary," Management Science,
Vol. 12 (1965), pp. B6-B9.

American Management Association (The), "O.R. Reconsidered," Management
Report #10, Finance Division, 1958.

Archibald, K., "Three Views of the Expert's Role in Policymaking:
Systems Analysis, Incrementalism, and the Clinical Approach,"
Public Sciences, 1 (1970), pp. 73-86.

Argyris, Chris, "Management Information Systems: The Challenge to
Rationality and Emotionality," Management Science, Vol. 17 (1971),
pp. B275-B292.

_____, Interpersonal Competence and Organizational Effectiveness,
(Homewood, Illinois: Irwin, 1962).

Asch, S., "Effects of Group Pressure Upon the Distortion of Judgements," in Maccoby (ed.), Readings in Social Psychology, (1958).

Baker, Norman, "An Analysis of Several Environmental Factors Affecting Industrial OR/MS Activities," Unpublished Masters Thesis, Department of Industrial Engineering/Management Sciences, Northwestern University, 1965.

_____, "The Influence of Several Organizational Factors on the Idea Generation and Submission Behavior of Industrial Researchers and Technicians," Unpublished Ph.D. Dissertation, Northwestern University, 1965.

Banbury, J., "Operational Research and Innovation in Management Methods," Operational Research Quarterly, Vol. 19 (1968), pp. 377-387.

Barnard, Chester I., Functions of the Executive (Cambridge, Mass.: Harvard Press, 1938).

Beckhard, Richard, Organization Development: Strategies and Models (Reading, Mass.: Addison-Wesley Publishing Co., 1969), p. 22.

Beer, Stafford, "Researcher and Manager: Commentary," Management Science Vol. 12 (1965), pp. B10-B12.

Bennis, Warren G., K.D. Benne and R. Chin (eds.), The Planning of Change (New York: Holt, 1961).

Bennis, Warren G., "Theory and Method in Applying Behavioral Science to Planned Organizational Change," Journal of Applied Behavioral Science, 1, 4 (1965), pp. 337-360.

_____, "Researcher and Manager: Commentary," Management Science, Vol. 12 (1965), pp. B13-B16.

_____, Changing Organizations (New York: McGraw-Hill Book Co., 1966).

_____, Organization Development: Its Nature, Origins, and Prospects (Reading, Mass.: Addison-Wesley, 1969).

Black, Guy and W. Evan, "Staff Proposals for Innovations in Organizations" (1965-1966).

Blau, P.M., The Dynamics of Bureaucracy (Chicago: University of Chicago Press, 1955).

Blumstein, Alfred, Systems Analysis for Social Problems (Wash. D.C.: WORC, 1970).

Bower, "Systems Analysis for Social Decisions," OR, 17 (1969), pp. 927-940.

Brehm, J.W. and A.R. Cohen, Explorations in Cognitive Dissonance (New York: Wiley, 1962).

Bronowski, J., Science and Human Values (1959).

Churchman, C. West, R.L. Ackoff and E.L. Arnoff, <u>Introduction to Operations Research</u> (New York: John Wiley and Sons, Inc., 1957).

_____, "Case Histories Five Years After -- A Symposium," <u>Operations Research</u>, VIII (March-April, 1960), pp. 254-259.

_____ and P. Ratoosh, "Report on Further Implementation Experiments," Unpublished working paper, No. 26, Center for Research in Management Science, University of California, Berkeley, 1961.

_____ and A.H. Schainblatt, "The Researcher and the Manager: A Dialectic of Implementation," <u>Management Science</u>, Vol. 11 (1965), pp. B69-B87.

_____, <u>The Systems Approach</u> (New York: Delacorte Press, 1968).

_____, "Operations Research as a Profession," <u>Management Science</u>, Vol. 17 (1970), pp. B37-B53.

_____, <u>The Design of Inquiring Systems</u> (New York: Basic, 1971).

Clough, D., "Operations Research: A Critical Look," <u>Business Quarterly</u> (Spring, 1962).

Cock, L. and J.R.P. French Jr., "Overcoming Resistance to Change," <u>Human Relations</u>, VI (1948), pp. 512-533.

Collcutt, R.H. and R.D. Reader, "Choosing the O.R. Programme for BISRA," <u>ORQ</u>, <u>18</u> (1967), pp. 218-243.

Creelman, G.D. and R.W. Wallen, "The Place of Psychology in Operations Research," <u>Operations Research</u>, VI (Jan.-Feb., 1958) pp. 116-121.

Cushen, W. Edward, "Operations Research in Federal Civilian Government," Seminar delivered at University of California, Berkeley, (March, 1972).

Cyert, Richard M. and J.G. March, <u>A Behavioral Theory of the Firm</u> (Englewood Cliffs, N.J.: Prentice-Hall, 1963).

Doherty, P.A., "A Closer Look at Operations Research," <u>Journal of Marketing</u> (April, 1963).

Downs, Anthony, <u>Inside Bureaucracy</u> (Boston: Little, Brown and Company, 1966).

Dror, Yehezkel, <u>Public Policymaking Reexamined</u> (San Francisco: Chandler Publishing Company, 1968).

Dyckman, Thomas R., "Management Implementation of Scientific Research: An Attitudinal Study," Management Science, Vol. 13 (1967), pp. B612-B620.

Eilon, "Profile of Operational Research Society," ORQ, 20 (1969), pp. 247-274.

Ellul, Jacques, The Technological Society (New York: Knopf, 1965).

Engel, "Retirement Address -- Operations Research in Social Problems," Operations Research, 17 (1969), pp. 761-769.

Ericson, Richard F., "The Impact of Cybernetic Information Technology on Management Value Systems," Management Science, 18 (Oct., 1969), pp. B40-B60.

Evan, William M., "Researcher and Manager: Commentary," Management Science, Vol. 12 (1965), pp. B17-B19.

Gardner, John W., Self Renewal (New York: Harper and Row, 1963).

Ginzberg, E. and E. Reilly, Effecting Change in Large Organizations (New York: Columbia University Press, 1957).

Goldman, Alan J., "Discussion," in Alfred Blumstein et. al., Systems Analysis for Social Problems (Wash., D.C.: WORC, 1970).

Golembiewski, Robert E., "Personality and Organization Structure: Staff Models and Behavioral Patterns," Academy of Management Journal, 9 (Sept., 1966), pp. 217-232.

Hagstrom, Warren, The Scientific Community.

Halbrecht, Herbert, et. al., "Through a Glass Darkly," Interfaces, 2 (August, 1972), pp. 1-17.

Halsbury, Earl of, "The Art of Exposition," ORQ, 11, 1-2, (March-June, 1960), pp. 1-15.

Hammond, R.A., "Getting Better Results from Operations Research," abstract in Management Review (October, 1962).

Hankin, B., "The Communication of the Results of Operational Research to the Makers of Policy," ORQ, 9, 4, (December, 1968), pp. 293-301.

Hanssmann, Fred, "Researcher and Manager: Commentary," Management Science, Vol. 12 (1965), pp. B22-B23.

Harvard University, Program on Technology and Society 1964-1972, A Final Review (Cambridge: Harvard, 1972).

Harvey, Allan, "Factors Making for Implementation Success and Failure," Paper presented at XVI International Meeting of The Institute of Management Sciences, New York City, March 27, 1969.

_____, "Implementation Success and Failure," Management Science, 16, (1970), pp. 312-320.

Hatry, Harry P. and Donald M. Fisk, "Improving Productivity and Productivity Measurement in Local Governments," President's National Commission on Productivity (1971).

Heiman, David R., "A Procedure for Predicting the Potential Success or Failure of an OR/MS Activity," Unpublished Masters Thesis, Northwestern University, Department of Industrial Engineering and Management Sciences, (May, 1964).

Hertz, David B., "Has Management Science Reached a Dead End?", Innovation, 25 (1971).

Hickox, C., "Role of the Company Technician in O.R.," Proc. on the Conf. on "What is O.R. Accomplishing in Industry?", (April 5-7, 1955), Case, 1955, pp. 63-65.

Hicks, Harry T., "An Analysis of Southern Pacific's Boxcar Information System and Causes of Its Failure," Unpublished Masters Thesis, Graduate School of Business Administration, University of California, Berkeley, December, 1959.

Hitch, C.J., "Sub-Optimization in Operations Problems," Journal of the Operations Research Society of America, I (May, 1953), pp. 87-99.

_____ and R. McKean, "Suboptimization in Operations Problems," in J.F. McCloskey and F.F. Trefethen (eds.) Operations Research for Management (Baltimore: The Johns Hopkins Press, 1954), pp. 168-186.

_____, "An Appreciation of Systems Analysis," Operations Research, Vol. 3 (1955), pp. 466-481.

_____, "Comments on 'Fallacies in O.R.,'" Operations Research, IV, (August, 1956), pp. 426-430.

_____, "Systems Approach in DOD," Operations Research Quarterly, 19, Special Conference issue (April, 1968).

Hoffman, R., "Implementing Information and Computer Technology to the Urban Police Functions Through Systems Analysis," Police Research Bulletin (January, 1968).

Holmer, "Management Research in State and Local Government," Operations Research, 16, 6 (1968).

Hoos, Ida R., "Systems Analysis as a Technique for Solving Social Problems -- A Realistic Overview," Working Paper No. 88, Institute of Urban and Regional Development, University of California, Berkeley, 1968.

_____, "Information Systems: Public Planning," Management Science, 17, 10 (June, 1971).

Hovland, C. (ed.), The Order of Presentation (New Haven: Yale University, 1957).

Huber, George P., "Implications of Organization Theory for Research Management," Research Management, X (1967), pp. 301-307.

Huysmans, Jan H.B.M., "The Implementation of Operations Research: A Study of Some Aspects Through Man-Machine Simulation," Internal Working Paper No. 78, Space Sciences Laboratory, Social Sciences Project, University of California, Berkeley, January, 1968.

_____, The Implementation of Operations Research: An Approach to the Joint Consideration of Social and Technological Aspects (New York: John Wiley and Sons, Inc., 1970).

_____, "Cognitive Style Constraint in Implementation," Management Science, 17, 1 (1970).

Kandrick, John W. and Daniel Creamer, Measuring Company Productivity: Handbook With Case Studies, Studies in Business Economics No. 74 (New York: National Industrial Conference Board, 1961).

Kaplan, Abraham, The Conduct of Inquiry (Scranton: Chandler, 1964).

Kellerher, Grace (ed.), The Challenge to Systems Analysis (New York, 1970).

Koontz, Harold and Cyril O'Donnell, Principles of Management (New York: McGraw-Hill, 1959).

Kuhn, Thomas S., The Structure of Scientific Revolutions (Chicago: University of Chicago, 1962).

Ladd, Donald E., "Report on a Group's Reaction to: 'The Researcher and the Manager: A Dialectic of Implementation,'" Management Science, Vol. 12 (1965), pp. B24-B25.

Lehrer, Robert N. (ed.), The Management of Improvement: Concepts Organization and Strategy (New York: Reinhold, 1965).

Leys, Wayne A.R., Ethics for Policy Decisions (1952).

Lindblom, Charles E., "Decision Making in Taxation and Expenditures," in National Bureau for Economic Research, Public Finances: Needs, Sources and Utilization (1961).

_____, The Policy-Making Process (Englewood Cliffs, New Jersey: Prentice-Hall, 1968).

_____, "The Science of 'Muddling Through,'" Public Administration Review.

Littauer, Sebastian B., "Conceptualization and Formalization -- The Impossible and the Obvious," Management Science, Vol. 12 (1965), pp. B26-B28.

Lucas, "Optimal Management of a R&D Project," MS, 17 (July, 1971), pp. 679-697.

Lynd, Robert S., Knowledge for What? (Princeton: Princeton University, 1939).

Malcolm, D.G. "On the Need for Improvement in Implementation of O.R.," Management Science, Vol. 11 (1965), pp. B48-B58.

Manley, J.H., "A Measure of the Probability of Success for OR/MS Projects Due to Client Behavior," Unpublished Ph.D. dissertation, University of Pittsburgh, Business Administration, 1971.

Mann, A., "Top Management Appraisal of O.R.," Proc. of 7th Annual I.E. Institute, University of California, Berkeley (Jan. 28, 1955), pp. 18-23.

March, James G. (ed.), Handbook of Organizations (Chicago: Rand McNally and Company, 1965).

Marcuse, Herbert, An Essay on Liberation (Boston: Beacon, 1969).

Marquis, Donald G. (ed.), Research Program on the Management of Science and Technology, Second Report 1965-1967 (M.I.T. Sloan School of Management, 1967).

Maslow, A., The Psychology of Science, (1966).

Mason, R., "A Dialectical Approach to Strategic Planning," Management Science, 15, 8 (April, 1969).

McCloskey, J.F. and F.F. Trefethen (eds.), Operations Research for Management (Baltimore: Johns Hopkins, 1954).

McKean, Roland, Efficiency in Government Through Systems Analysis With Emphasis on Water Resources Development, ORSA Publications in Operations Research No. 3 (New York: John Wiley and Sons, Inc., 1958).

Meier, Robert C., "The Administration of Industrial Operations Research," A Ph.D. Dissertation, University of Minnesota, 1960.

Melden, M., "Communicating New Concepts to Management," L.P. and Invent. Management Seminar Proc., Pitts, Methods Engin. Council (Sept. 15, 1955), pp. D1-D7.

Merton, Robert K., "The Role of Applied Social Science in the Formation of Policy: A Research Memorandum," Philosophy of Science, 16, 3 (July, 1949).

_____, Social Theory and Social Structure, 2nd ed., (Glencoe, Illinois: Free Press, 1957).

Mintzberg, Henry, "Managerial Work: Analysis from Observation," Management Science, 18 (Oct., 1971), pp. B97-B110.

Mitroff, Ian, "Fund. Issues in the Simulation of Human Behavior," Management Science, Vol. 15 No. 12 (Aug., 1969), pp. 635-649. (Also see letters, Management Science, [Oct., 1970]).

_____, "Dialectical Inquiring System," MS, 17 (June, 1971), pp. 634-648.

Morse, Philip and G.E. Kimball, Methods of Operations Research (New York: John Wiley and Sons, 1951).

_____ (ed.), Operations Research for Public Systems (Cambridge, Mass.: M.I.T. Press, 1967).

_____, "The History and Development of Operations Research," in Grace Kellerher (ed.), The Challenge to Systems Analysis (New York, 1970).

Novick, David (ed.), Program Budgeting: Program Analysis and the Federal Budget (Cambridge, Mass.: Harvard University Press, 1965).

Mushkin, Selma, Implementing PPB in State, City and County (A Report of the 5-5-5 Project) (Washington, D.C., 1969).

Nutt, A., "Considerations in Implementing an R&D Resources Allocation," paper XIX conference of TIMS.

Oldaker, Richard B., "A Survey of O.R. Organizations in Selected U.S. Corporations," Unpublished Masters Thesis, Graduate School of Business Administration, University of California, Berkeley, 1966.

Oshikawa, Sadaomi, "Consumer Pre-decision Conflict and Post-Decision Dissonance," Behavioral Science (1969), pp. 132-140.

Pelz, D.C. and F.M. Andrews, _Scientists in Organizations_ (New York: John Wiley and Sons, 1966).

Pennycuick, K., "Presentation and Implementation of the Results of O.R.," in _O.R. for Management_ (ed.) R.T. Eddison, K. Pennycuick and B.H.P. Rivett (New York: John Wiley and Sons, Inc., 1962), pp. 228-298.

Prest, A.R., "Cost Benefit Analysis: A Survey," _Economic Journal 75_ (1965), pp. 683-730.

Radnor, Michael, A.H. Rubenstein and A.S. Bean, "Integration and Utilization of Management Science Activities in Organizations," _Operational Research Quarterly_, Vol. 19 (1968), pp. 117-141.

_____ and D. Mylan, _Preliminary Annotated Bibliography_, Program on the Adoption and Diffusion of OR/MS in Business and Government: U.S. and Overseas (July, 1968).

_____, A.H. Rubenstein and David A. Tansik, "Implementation in Operations Research and R&D: In Government and Business Organizations," Presented at Operations Research Society of America 24th National Meeting (Philadelphia, Penn., November, 1968).

_____, David A. Tansik and Michael J. White, "An Overview of U.S. Government Experience with Management Science: Survey Report on Forty Government Agencies," Paper presented at Northwestern University, Washington Operations Research Council, American Society of Public Administration Workshop on Management Science in Federal Civilian Government (December, 1968).

_____, David A. Tansik and Michael White, "Trends in the Integration of Management Science Activities in the Federal Civilian Agencies," Paper presented at XIX International Meeting of the Institute of Management Sciences.

_____, A.H. Rubenstein and D.A. Tansik, "Implementation in Operations Research and R&D in Government and Business Organizations," _Operations Research_, Vol. 18 (1970), pp. 967-991.

_____, "The Shifting Patterns of Success and Failure of Management Science and Industry," in H. Halbrecht (et.al.), "Through a Glass Darkly," _Interfaces_, 2 (August, 1972), pp. 10-14.

Ratoosh, Philburn and C. West Churchman, "Innovation in Group Behavior," Unpublished working paper, No. 10, Center for Research in Management Science, University of California, Berkeley, 1960.

Ratoosh, Philburn, "Experimental Studies of Implementation," (May, 1965), CP-117, Center for Research in Management Science, University of California, Berkeley.

_____, "Experimental Studies of Implementation," in Operational Research and the Social Sciences (ed.) J.R. Lawrence (London: Tavistock Publications, 1966), pp. 251-261.

Reader, Louis T., "Roadblocks to Progress in the Management Sciences and Operations Research," Management Science, Vol. 11 (1965), pp. C1-C5.

Rogers, Everett M., Diffusion of Innovations (New York: Free Press, 1967).

Rosner, Martin M., "Administrative Controls and Innovation," Behavioral Science, XIII (January, 1968), pp. 36-43.

Rubenstein, Albert H., "Integration of Operations Research Into the Firm," The Journal of Industrial Engineering (Sept.-Oct., 1960), pp. 421-428.

_____ and John B. McColly, "Phases in the Life Cycle of Industrial Operations Research Groups," Department of Industrial Engineering and Management Sciences, Northwestern University, 1961.

_____, "The Role of Implementation in Several Aspects of the Research and Development Process," Paper presented at the meeting of The Institute of Management Sciences, Philadelphia, Penn., September, 1966.

_____, M. Radnor, N. Baker, D. Heiman and D. McColly, "Some Organizational Factors Related to the Effectiveness of Management Science Groups in Industry," Management Science, XIII (April, 1967), pp. B508-B518.

Sapolsky, "Science Advice for State and Local Government," Science, 160 (April 19, 1968), p. 280.

Schein, Edgar H., Organizational Psychology (Englewood Cliffs, New Jersey: Prentice-Hall, 1965).

Scherer, Frederic M., "Government Research and Development Programs," in Robert Dorfman (ed.), Measuring Benefits of Government Investments (Wash., D.C.: Brookings, 1965).

Schlesinger, J., "Systems Analysis and the Political Process," (June, 1967), Rand Paper, P. 3464.

Schon, Donald R., "Managing Technological Innovation," Harvard Business Review, Vol. 47, No. 3 (May-June, 1969), pp. 156-168.

_____, "Problems in Implementation," in A. Blumstein (ed.), Systems Analysis for Social Problems (Wash.: WORC, 1970).

Schultz, Charles L., The Politics and Economics of Public Spending
(Wash., D.C.: Brookings, 1968).

Scriven, Michael, "The Logic of Cause," Theory and Decision, 2
(1971), pp. 49-66.

Scott, W. Richard, S.M. Dornbush, B.C. Bushing and J.D. Laing, "Organiza-
tional Evaluation and Authority," Administrative Science Quarterly,
XII (June, 1967), pp. 93-117.

Serkes, N.N., "Setting the Stage: For Implementation of More Scientific
Management Techniques," Paper presented at the XVI International
Meeting, The Institute of Management Sciences (New York City, March
27, 1969).

Shakun, M., "Comparative O.R.," Management Science, 15 (1968), pp. 11-12.

_____, "M.S. and Management: Implementing M.S. via Situational
Normativism," Management Science, 18, 8 (April, 1972).

Sherif, A., "A New Model for International OR/MS Implementation,"
Paper presented to XIX International Meeting of TIMS (April, 1972).

Shycon, Harvey N., "All Around the Model, Perspectives on M.S.
Applications," The Bulletin of the Institute of Management Sciences,
Vol. 1, No. 1 (November, 1970), pp. 35-37.

Simon, Herbert A., "Authority," in Conrad M. Arensberg et.al.,
Research in Industrial Human Relations (New York: Harper, 1957).

_____, Administrative Behavior (New York: The Free Press, 1957).

_____, "Theories of Decision-Making in Economics and Behavioral
Science," The American Economic Review, 49 (June, 1959).

_____, The Sciences of the Artificial (Cambridge, Mass.:
The M.I.T. Press, 1969).

Skinner, B.F., Beyond Freedom and Dignity (New York: Knopf, 1971).

Solandt, O.M., "Researcher and Manager: Commentary," Management Science,
Vol. 12 (1965), p. B29.

Staats, Elmer B., "Applying Operations Research and the Management
Sciences to the Problems of Government," Management Science, Vol. 11
(1965), pp. C6-C12.

Starr, Martin K., "Researcher and Manager: Commentary," Management
Science, Vol. 12 (1965), pp. B30-B35.

_____, "The Politics of Management Science," Interfaces,
Vol. 1, No. 4 (June, 1971), pp. 31-37.

Stillson, Paul, "Implementation of Problems in Operations Research," *Journal of Operations Research*, <u>11</u> (January, 1963), pp. 140-147.

Stimson, D., "O.R. and Systems Analysis in Hospital Administration," Unpublished working paper, Institute of Urban and Regional Development, U.C. Berkeley (April, 1971).

Suchman, Edward A., <u>Evaluative Research</u> (New York: Russell Sage Foundation, 1967).

Swan, A., "Human Rel. in Industrial O.R.," <u>The Engineer</u>, <u>194</u>, 5035 (July 25, 1952), pp. 117-120.

_____, "Running an O.R. Department in an Industrial Organization," <u>Journal of Industrial Engineering</u>, VIII (Sept.-Oct., 1957), pp. 264-274.

Swinth, "Organiz. Problem Solving," <u>MS</u>, <u>18</u> (Oct. 1971), pp. 68-79.

Tansik, David A., "Environmental Influences on Organizational Behavior Regarding the Implementation of Operations Research/Management Sciences Research Recommendations," Unpublished Masters Thesis, Northwestern University, June, 1968.

_____, "Influences of Organizational Goal Structure on the Selection and Implementation of Management Science Projects," Unpublished Ph.D. Thesis, Graduate School of Management, Northwestern University, 1970.

_____ and M. Radnor, "An Organization Theory Perspective on the Development of New Organizational Functions," <u>Public Administration Review</u> (Nov.-Dec., 1971), pp. 644-652.

Torrey, E. Fuller, <u>The Mind Game: Witchdoctors and Psychiatrists</u> (New York: Emerson Hall, 1972).

Trist, E.L. and K.W. Bamsforth, "Some Social and Psychological Consequences of the Long-Wall Method of Coal-Getting," <u>Human Relations</u>, IV (1951), pp. 3-38.

_____, "Socio-Technical," in C.W. Churchman and M. Verhulst (eds.), <u>Management Science</u> (1960).

_____, G. Higgen, H. Murray and A. Pollack, <u>Organizational Choice</u> (London: Tavistock, 1963).

Tullock, G., <u>The Politics of Bureaucracy</u> (Washington, D.C.: Public Affairs Press, 1965).

Turban, E., "The Role of Information in the Implementation of Operations Research Techniques for Plant Maintenance Management," Working Paper No. 183, Center for Research in Management Science, University of California, Berkeley, August, 1966.

Turban, E., "How They're Planning O.R. at the Top," _Industrial Engineering_, Vol. 1, No. 12 (December, 1969), pp. 16-20.

U.S. Congress, Joint Economic Committee, _The Analysis and Evaluation of Public Expenditures: the PPB System_ (Wash., D.C.: USGPO, 1969).

U.S. President's Task Force on Science Policy, "Science and Technology: Tools for Progress" (April, 1970, Wash., D.C.: U.S. Government Printing Office).

United States Senate, "Planning-Programming-Budgeting: Hearings Before the Subcommittee on National Security and International Operations of the Committee on Government Operations, United States Senate, Part I" (Wash., D.C.: August 23, 1967).

Vertinsky, I., "OR/MS Implementation in Valle, Columbia," _Management Science_, 18, 8 (April, 1972).

Vollmer, Howard H., "Researcher and Manager: Commentary," _Management Science_, Vol. 12 (1965), pp. B36-B39.

Von Mises, Ludwig, _Bureaucracy_ (1944).

Wasserman, Paul, _Measurement and Evaluation of Organizational Performance, An Annotated Bibliography_ (Ithaca, N.Y.: Cornell, 1959).

White, Michael J., "Top Management and Management Science," Paper presented at the National Conference of the American Society for Public Administration, Denver, Colorado, April, 1971.

_____, "Patterns in the Development of Operations Research and Management Science in Government," Paper presented at the Annual Meeting of the American Political Science Association, Chicago, Ill., September, 1971.

_____, "Management Science in Federal Civilian Agencies," Ph.D. dissertation in progress, Dept. of Political Science, Northwestern University, 1972.

_____, "The Impact of Management Science on Political Decision Making," in F. Lyden and E. Miller, _Planning Programming Budgeting: A Systems Approach to Management_ (rev.ed.) (Chicago: Markham, 1972).

Wildavsky, Aaron, _The Politics of the Budgetary Process_ (Boston: Little, Brown & Co., 1964).

_____, "Comprehensive vs. Incremental Budgeting in the Dept. of Agriculture," _Admin. Science Quarterly_, 10, 2 (Sept., 1965).

Williams, Walter, _Social Policy Research and Analysis_ (New York: American Elsevier, 1971).

Wynne, B.E., "A Pattern for Reporting Operations Research to the Business Executive," _Management Technology_, 1, 3 (Dec., 1961).