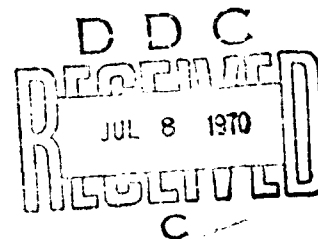


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FROM MANAGEMENT SCIENCES TO POLICY SCIENCES

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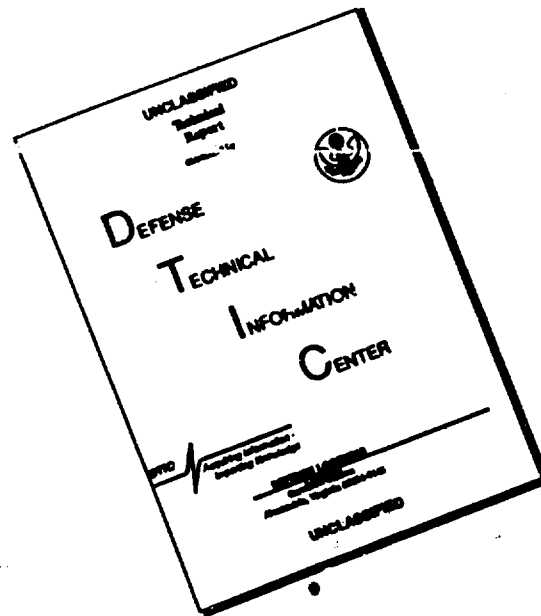
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FROM MANAGEMENT SCIENCES TO POLICY SCIENCES

by

Yehezkel Dror^{*}

The RAND Corporation, Santa Monica, California

and

The Hebrew University of Jerusalem, Israel (on leave)

ABSTRACT

MANAGEMENT SCIENCES REPRESENT A SIGNIFICANT ADVANCE IN KNOWLEDGE ON HOW TO CONTROL AND DIRECT SIMPLE ISSUES. UNDER THE PRESSURE OF INCREASINGLY PERCEIVED, COMPLEX SOCIAL ISSUES, EFFORTS ARE UNDER WAY ALSO TO UTILIZE MANAGEMENT SCIENCES FOR THEIR RESOLUTION. THESE EFFORTS CANNOT SUCCEED BECAUSE OF LIMITATIONS INHERENT IN THE BASIC CHARACTERISTICS OF MANAGEMENT SCIENCES, INCLUDING: NEGLECT OF INSTITUTIONAL CONTEXTS, INABILITY TO HANDLE POLITICAL NEEDS, "IRRATIONAL" PHENOMENA AND VALUE ISSUES; LIMITED ALTERNATIVE INNOVATION CAPACITY; DEPENDENCE ON PREDICTABILITY AND QUANTIFICATION; AND IGNORANCE OF STRATEGY CHOICES. ESPECIALLY PRONOUNCED IS THE INADEQUACY OF MANAGEMENT SCIENCES FOR HANDLING BROAD ISSUES, SUCH AS NATIONAL MODERNIZATION POLICIES. THE BASIC FRAME OF APPRECIATION OF MANAGEMENT SCIENCES CAN CONTRIBUTE MUCH TO POLICYMAKING, BUT TO DO SO IT MUST BE DETACHED FROM PARTICULAR TECHNIQUES AND ENHANCED INTO A BROADER ORIENTATION AND METHOD. ENHANCEMENT STEP ONE INVOLVES DEVELOPMENT OF POLICY ANALYSIS AS A METHOD FOR HANDLING COMPLEX POLICY AND MEGAPOLICY ISSUES. VALUE CONSIDERATION, MULTIPLE OPERATIONAL CODE ASSUMPTIONS, POLITICAL FEASIBILITY MAPPING AND POLICY ANALYSIS NETWORK ELABORATION -- THESE ARE AMONG THE SPECIFIC CONTRIBUTIONS OF POLICY ANALYSIS. ENHANCEMENT STEP TWO INVOLVES IMPROVEMENT OF THE POLICYMAKING SYSTEM THROUGH CHANGES IN PROCESSES, STRUCTURES, PERSONNEL, AND OTHER COMPONENTS. IN ORDER TO SUCCEED IN THOSE TWO ENHANCEMENT STEPS AND TO MOVE ON TOWARD SIGNIFICANT IMPROVEMENTS OF POLICIES AND POLICYMAKING, A "SCIENTIFIC REVOLUTION" SEEMS NECESSARY: A NEW SET OF PARADIGMS IS NEEDED WHICH IS ORIENTED TOWARD THE NEEDS OF APPLYING STRUCTURED RATIONALITY, SYSTEMATIC KNOWLEDGE AND ORGANIZED CREATIVITY TO THE DIRECTED DEVELOPMENT OF HUMANITY. THE EMERGING SUPRADISCIPLINE OF POLICY SCIENCES PROVIDES THESE NEW PARADIGMS. MANAGEMENT SCIENCES SHOULD BE RELATED CLOSELY TO POLICY SCIENCES, WITH SUITABLE ADJUSTMENTS IN ITS TEACHING, RESEARCH AND PRACTICE.

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INADEQUACIES OF MANAGEMENT SCIENCES

It is not easy to discuss management sciences as a whole because quite a heterogeneous set of orientations, perceptions, methodologies, techniques, and tools are at ne time or another covered by that term. (This is the reason I prefer to speak about management sciences in the plural.) Therefore, every discussion of "management sciences" can easily be contradicted by the statement that the disputant has in mind quite a different concept of management sciences. Also, because many leading management scientists are brilliant persons, it is not difficult to quote one or two authors to contradict every critic of management sciences.¹

Because of this vagueness of the concept "management sciences," let me antecede discussion of the inadequacies of management sciences with a few observations of what I am talking about. I am not discussing expressions of good intentions or exhortations of what management sciences should be or prophecies of what management sciences will be like in the undefined future. My subject is management sciences as it is now and as it can be expected to be, unless it changes by a step level function.

Management sciences can in part be circumscribed by enumeration of some concepts that overlap with them, include them, or constitute elements of management sciences. The more relevant concepts include:

¹
For instance, many of my arguments are recognized, discussed, and, in part, answered or accepted by authors such as Stafford Beer and C. West Churchman.

operations research, decision theory, management cybernetics, information theory, managerial economics, organization theory, systems engineering, engineering economics, systems analysis, PPBS, linear and dynamic programming, simulation, benefit-cost analysis, network analysis, and more. Each one of the broader elements mentioned at the beginning of this list overlaps with some others and includes some or all of the techniques mentioned in the latter part of the list. But, in the aggregate, this list expresses the scope of management sciences, which is the subject matter of this paper.

There is no doubt that management sciences constitute a great advancement in human capability to handle some types of problems. Indeed, looking on management sciences in their broader conception, they constitute a major effort to apply structured rationality to problems of choice. In particular, management sciences contribute three main elements to better decisionmaking:²

- (a) Looking at problems and alternatives in a broad way, which tries to take account of many of the relevant variables and of the probable results, that is, taking a "systems" view.
- (b) Searching for an "optimal," or at least clearly preferable, solution among available alternatives within a broad "benefit-cost" frame, without being limited to incremental changes.

²These elements are best explicated in systems analysis and systems approach. For example, see E.S. Quade and W.I. Boucher, eds., *Systems Analysis and Policy Planning: Applications in Defense* (New York: American Elsevier, 1968) and C. West Churchman, *The Systems Approach* (New York: Delacorte Press, 1968).

- (c) Explicit and rational identification of the preferable alternative (or alternatives) through comparison of expected results in terms of operational goals; this is done with the help of a large set of techniques, ranging from mathematical models to human gaming and from sensitivity testing to canvassing of experts' opinions.

Encouraged by the obvious universality of these elements and by significant successes in some areas, it is natural that many management scientists want to move on from the very limited issues with which they have been dealing to the more comprehensive societal problems to which contemporary society gets increasingly sensitized. Thus, many management scientists want to apply their knowledge to urban problems and ecological issues in the modern countries and to accelerated modernization issues in the less developed countries.

I personally have been involved in such an effort in Israel, as senior consultant to the Budget Division of the Ministry of Finance and to the Inter-Ministerial Efficiency Committee. The assignment there was to improve governmental decisionmaking. A survey of decisionmaking practices clearly brought out the need for improvements, but a survey of management sciences led to my conclusion that in their present state, they could be of only limited utility for improvement of decisionmaking on complex issues.

In particular, management sciences -- including the more general parts of systems analysis -- were found, in my opinion, inadequate in the following respects:

- (a) Management sciences focus on proposing preferable policies while neglecting the institutional contexts of both the problems and the policymaking and policy-implementation processes. Thus, "institution-building" is not within its domain of applicability.
- (b) Management sciences are unable to handle political needs, such as consensus-maintaining and coalition-building.
- (c) Management sciences are unable to deal with "irrational" phenomena, such as ideologies, charisma, high-risk commitments, self-sacrifice, and unconventional styles of life.
- (d) Management sciences are unable to deal with basic value issues and often inadequately explicate the value assumptions of analysis.
- (e) Management sciences deal with identifying preferable alternatives among available or easily synthesized ones. Invention of radically new alternatives is beyond its scope, though it can perhaps help by showing the inadequacy of available alternatives.
- (f) Management sciences require some predictability in respect to alternatives. Situations of "primary uncertainty" (when not only the probabilities of various outcomes, but the dimensions of the possible outcomes are unknown) cannot be handled by systems analysis.

- (g) Management sciences depend on significant quantification of main relevant variables and availability of models permitting "exercising" of these variables. Therefore, complex social issues cannot be dealt with³ and behavioral science knowledge is ignored.
- (h) Basic ~~strategy~~ choices -- such as attitudes to risk and time -- are not explicitly faced by management sciences. Rather, maximin or minimax and discount of the future ("positive interest rates") are usually assumed.

These eight characteristics are not equally shared by all management sciences studies. Indeed, the main pioneers of management sciences do clearly label such characteristics as inadequate and do diligently search for ways to overcome them. But, if we look on available management sciences studies of real issues rather than at professions of faith, introductory statements, or a few outstanding studies, then this list of inadequacies of present management sciences may justly be criticized as overmild.

Let me try and illustrate weaknesses of contemporary management sciences by enumeration of some typical (though not universal) omissions in three areas of studies:

³But, see the pioneering efforts of Forrester, especially Jay W. Forrester, *Urban Dynamics* (Cambridge, Mass: M.I.T. Press, 1969). This effort is often regarded as outside "management sciences."

- (a) Transportation studies: Preoccupation with "mix-of-modes" issues and with satisfaction of extrapolated consumer demands, within a benefit-cost frame. Some attention to pollution effects, especially when susceptible to translation into economic values. Ignorance of changes in the values to be served by future transportation, such as transportation tastes, aesthetic feelings, new patterns of leisure time use. Neglect of transportation impacts on community life and social interaction. Ignorance of possible positive functions of inadequate transportation. Ignorance of political and power implications of transportation. Inadequate treatment of interfaces between transportation and communication, housing, and various aspects of the patterning of human activities in space.
- (b) Defense studies: Preoccupation with low-level aspects of defense, including equipment and tactics. Just beginning to face issues of "non-rational" adversaries. Little explication of basic value assumptions and of scenarios based on radically different assumptions. Ignorance of internal political and cultural conditions and domestic implications of external defense policies. Very weak treatment of interfaces between socio-political-cultural issues and defense issues in other countries. Very weak treatment of relations between defense activities and other external activities, especially socio-economic ones.

- (c) Public safety: Tendency to define public safety in objective rather than phenomenological terms, i.e., number of crimes, rather than feeling of safety or propensity to deviate. Concentration on efficiency of law enforcement, rather than underlying causes of problems. Short-range approach, with very little attention to longer range interfaces between public safety and, for instance, youth culture.

The limitations of management sciences can be further clarified by examining the applicability of management sciences to various issues faced by less developed nations.⁴ (See Table 1 - Potential Uses of Management Sciences for Accelerated Modernization Decisions, page 9.)

My main conclusion can fairly be summarized as follows: Management sciences can be of significant help in dealing with many important low-level and medium-level decisions, as well as high-level sub-optimized problems. But, all broader policy problems are beyond management sciences in their present form. Also, most of the sub-components of policy problems cannot be dealt with correctly by management sciences until some basic strategy issues are determined by other methods and until much creative invention of new alternatives takes place. Furthermore, even in respect to many medium-level and some low-level problems, resolution of strategy problems and alternative invention are often

⁴Compare Yehezkel Dror, "Systems Analysis for National Modernization Decisions: Applicability, Feasibility, Effectiveness and Efficiency," *Academy of Management Journal*, June 1970 (in press).

Table 1

POTENTIAL USES OF MANAGEMENT SCIENCES FOR ACCELERATED MODERNIZATION DEVICES

Problem area	Management Sciences Indispensable	Management Sciences Somewhat Useful	Management Sciences Very Useful
Agriculture	Land reform; adequate resources commitment; internal political implications; decrease of innovation; decrease of diversification; main development directions; foreign implications, attitudes towards work.	Rail; land reallocation, training; monitoring system.	Land use and product mix; irrigation, distribution and marketing systems.
Culture	"National identity"; encouragement of indigenous art and creative crafts; attitudes towards rationality; metropolitan, social & political values; language; ethnic problems; clash between traditional and modernizing values.	Some aspects of written language development; mass communication.	Communication network construction and management.
Defense	Main goals; adequate resources commitment; basic internal political implications, strategies and basic postures; internal problems of armaments; external aid and procurement opportunities.	Estimation of protection needs; weapon systems choices; specific resource allocation; force composition; defense R&D; defense production.	Low-level weapon mix; logistics, communication and some manpower problems.
Education and Manpower	Main strategies (adult training, mass education, technical education, etc.); political & ideological implications; adequate resource allocation; teacher training; preparation to innovate; interaction with basic economic, social, and foreign policies.	Learning methods and devices; "brain drain"; educational networks; location of facilities; teaching-manpower utilization; curriculum programming; some manpower planning; facility planning.	Facility programming and utilization.
Foreign Relations	Main goals; resource commitment; internal political implications; basic strategies & involvement.	Prediction of exogenous variables; country investment benefit-cost estimation.	Some aspects of external presentation network (e.g., location, communication, logistics).
Health	Adequate resource commitment; main strategies; basic structure (public insurance, etc.); problems of "health culture"; health habits & healing traditions; recruitment & training of foreign aid; concepts of health; political & professional aspects (e.g., feasibility of using "non-professional" practitioners).	Some aspects of treatment systems; some aspects of training of professionals; medical R&D; facility planning.	Facility programming and utilization.
Industrialization	Main strategies; risk policy; resource commitment; basic instrument (public initiative, encouragement of private enterprise, etc.); external aid recruitment and handling; attitudes towards work.	Project choice; R&D policy; monitoring system; sector interdependence; marketing planning.	Project programming and implementation.
Internal Politics	"Nation-building" strategies; condition building & maintenance; leader recruitment & development; political system; elite transformation; propensities to innovate; political ideologies & values; rates of success in conflict & war; transfer of power to modernizing agents, etc.	Communication and political socialization networks; some problems of internal security.	Some technical issues, such as election organization.
Population	Main strategies; basic social, cultural & political goals; resource commitment; external implications and pressures.	Comparison of alternative control methods; information and propaganda system; incentive system; monitoring system.	Distribution network for control devices and their logistics.

necessary before management sciences apply usefully. Indeed, one of the most serious dangers posed by management sciences when applied to complex issues is that they will improve some sub-decisions without penetrating to the main policy choices. The counterproductive result may often be that incorrect operations may be done more efficiently.

ENHANCEMENT STEP ONE: TOWARDS POLICY ANALYSIS

The basic weaknesses of management sciences in respect to complex social issues belong to two major categories:

- (a) Inability to design and identify preferable policies on complex, non-quantifiable, politics-loaded issues.
- (b) Nearly complete neglect of the metapolicy level; that is, of policies on how-to-make policy. Improvement of the policymaking system and establishment of megapolicies (i.e., broad guidelines for a number of policies) are beyond the present domain of management sciences, even though they are critical for the improvement of policymaking.

Therefore, in order to make management sciences relevant for complex social issues, it is necessary to develop methods for handling complex policy issues and to move on to the improvement of metapolicies. A first step in these two directions is the development of policy analysis as a methodology for dealing with complex policy issues and with some megapolicy issues.

To the basic framework of management sciences, policy analysis adds the following components:⁵

⁵For an earlier treatment, see Yehezkel Dror, *Policy Analysis: A Theoretic Framework and Some Basic Concepts*, (RAND Paper, P-4156, July 1969).

- (a) Penetration into underlying values, assumptions, and strategies. These include, in particular: (1) exploration of the basic values at which policies should be directed; (2) long-range goal research; and (3) explicit analysis of alternative megapolicies.
- (b) Consideration of political variables, including: (1) political feasibility analysis; (2) evaluation of alternative political pathways for policy approval and implementation; (3) examination of social power implications of alternative policies; (4) analysis of coalition needs and political consensus implications; and (5) specification of changes in the policymaking systems needed in order to make otherwise clearly preferable policies politically feasible. (These specifications are one of the inputs into the study and improvement of policymaking systems, thus illustrating the cohesion and feedbacks between the different necessary enhancements.)
- (c) Treatment of broader and more complex issues, involving: (1) lower and new scales of quantification (e.g., nominal and non-metric); (2) necessity to satisfy multi-dimensional and diverse goals; (3) much primary uncertainty; (4) institutional change as a main mode of policy change; and (5) acceptance of min-avoidances (that is, avoidance of the worst of all bad alternatives), sensitization and long-range impacts as important goals of policy analysis, in addition to "preferization" or optimization.

- (d) Main emphasis on policy alternative innovation, involving: (1) intense attention to creativity encouragement and input of novel policy designs into the analysis; (2) much reliance on sequential decision-making, learning feedback and social experimentation instead of "models," simulation and detailed management sciences schemes (such as PERT); and (3) much attention to systems novadesign, in addition to systems redesigns.
- (e) Much sophistication in respect to social phenomena; for instance: recognition of "irrationality," ideologies, mass phenomena, depth-variables and similar non-rational phenomena as main variables, both of social behavior and of legitimate goal formation; and acceptance of apperception, intuition and "experience" as valuable sources of knowledge and insight.
- (f) Institutional self-awareness, for instance, in respect to: (1) the necessity for multiplicity and redundancy of analysis and analysis units; (2) early involvement of politicians, community leaders, etc. in the analytical activities; and (3) the limits of analysis as a perceptive set for cognizing human reality and aspirations.

Building up policy analysis, on the lines indicated above, requires construction of a conceptual set -- through borrowing from other disciplines, adjusting from available knowledge, and by invention. The conceptual set should be much more than a useful taxonomy; it must express the main dimensions of policy analysis, its methodology for dealing with policy problems, and its main modes for developing preferable policy alternatives. The concepts serve also as the main anchor points for tools and methods, which serve to make the concepts operational. Thus, the concepts stand between the basic design, approaches, and methodologies of policy analysis on one hand, and the technology of policy analysis on the other hand -- with close feedbacks and intense interconnections: Progress in policy analysis technology which comes, in part, from present management sciences should stimulate changes in concept and even design; changes in design result in new concepts and search for new technologies; and changes in concepts require revisions in design and transformations of technology. Simultaneously, policy analysis as a whole -- including design, concepts, and technology -- interacts closely with broader approaches to the improvement of policymaking and with the environment, both as an independent and as a dependent variable. Furthermore, all the involved elements and variables are dynamic in themselves; for instance, through invention and discovery advancing the state of knowledge of policy analysis.

Because of the multiple relevant change factors and their dynamics, any set of policy analysis concepts is of limited stability and sure to need early revision. This is particularly true at present with policy analysis being in its first phases of emergence. Any effort to provide a "complete" and elaborate set of policy analysis concepts is therefore misplaced. But, in order to advance, some starting points must be put forth. These starting point concepts -- while provisional and tentative -- are, in my opinion, sufficiently operative and innovative to demonstrate the feasibility of developing a high capacity policy analysis knowledge and to demonstrate the involved step-level changes required in contemporary management sciences. They even indicate the present availability of sufficient policy analysis knowledge to make a difference for the quality of policymaking -- if that knowledge is put carefully, but with determination, to work.

For the limited purposes of this paper, I have selected five policy analysis concepts for a closer look: megapolicies; value sensitivity; operational code assumptions; political feasibility; and policy analysis network. This is only a small subset of the complete (and open) set of policy analysis concepts. Thus, other interesting concepts include, for instance: value explorations; alternative futures and goals; policy alternative search patterns; leverage envelopes (not points!); unexpected occurrence considerations; sign monitoring and recognition (including "social indicators"); systems delimitation; and many more. But the five selected policy analysis concepts should serve to concretize the idea of policy analysis.

1. Megapolicies

Megapolicies involve determination of the postures, assumptions, and main guidelines to be followed by specific policies. They are a kind of "master policy," clearly distinct from detailed discrete policies, though these two pure types are on a continuum with many in-between cases. Explicit consideration of megapolicies is a major characteristic of policy analysis, differentiating policy analysis from contemporary management sciences. It is indeed quite amazing to note how neglected the problems of megapolicies are. Even the few authors who treat them explicitly do deal only with a narrow range of megapolicy choices and tend to be overinfluenced by one or another *a priori* ideology or the socio-economic-political conditions of a particular country and period.

There are a number of megapolicy dimensions, forming a multi-dimensional matrix with a large number of cells, presenting the different combinations of various megapolicy dimensions. Leaving aside the problems of calibration of the different dimensions -- some of which are continuous and some of which have only a few points -- there is the possibility of mixed strategies in which, in a given area of policy, different megapolicies can be followed in various policy instances. Whether to follow a "pure strategy" combination (a real cell of the multi-dimensional matrix) or whether to adopt a megapolicy mix (picking different cells according to a predetermined pattern, including as one possibility a random pattern) is itself a main megapolicy decision. There also are empty cells -- because of logical

contradiction; and nonfeasible cells -- because of behavioral conflict. When we consider all this together, the picture becomes very complex but not prohibitively so. We certainly can build up the main outline of a megapolicy matrix, identify essential conditions for each megapolicy, and find out at least some criteria for preference of different megapolicy combinations under various conditions.

To concretize the concept of megapolicy, let me mention eight main dimensions of megapolicy:

- (a) Pure-mixed. This dimension deals with the choice, to what extent different policies should be identical in their megapolicy (i.e., follow a "pure strategy") or follow a mixed strategy. Concerning mixed megapolicies, various sub-dimensions of consistency patterns, redundancy possibilities, pluralistic choice and random selection provide rich choice -- which can be explicated and analyzed.
- (b) Incremental-innovative. This dimension deals with the choice between various degrees of policy change (defined in terms of extent of change, scope of change, and time), ranging from small incremental change in few policy details over a long period to fargoin, comprehensive, and rapid policy innovation.
- (c) High risk-low risk. This dimension involves the degree of risk to be accepted in policies. Here, the pure choices are between maximax on one hand, and maximim or minimax on the other hand. Also

involved are preferences among "average expected value," "lottery value," and similar choice principles and different forms of risk parameters. Another very important element of this strategy are the principles to be followed in comparing uncertainties.

- (d) Comprehensive-shock. This dimension involves the choice between comprehensive and "balanced" policies, which try to move multiple variables simultaneously in an internally consistent way; and shock policies, aimed at breakthroughs via main leverage points and/or aimed at systems disequilibrium.
- (e) Sequential-extended. This dimension deals with the extent to which policies should adopt a sequential-decision mode or work out in advance an extended strategy. (In the theory-of-games sense. This choice should not be mixed up with the rigid/elastic dichotomy: an extended strategy can be very elastic and well adjusted to different contingencies, if nothing completely unexpected happens.)
- (f) Concrete goals-capacities for the future. This dimension deals with the choices between definite and concrete goals, a number of defined future options, and capacities better to achieve as yet undefined goals in the future. This is an especially

important megapolicy choice because in most more complex policy issues, the main results of a policy will occur in the future and sometimes in a quite distant future. Therefore, such policies should satisfy future values. But future values are very difficult to predict, adding a serious primary uncertainty to the uncertainties of predicting the results of different policy alternatives. In such cases, the "goal" should often be to increase options and build up reserves and capacities for goal setting and goal achievement in the future.

- (g) Positive goals -- minimum avoidance. In some respect, formulation of a goal in the positive or in the negative is a matter of syntax such as when we talk about "increasing the percentage of employed" or "reducing the percentage of unemployed." But often, the positive and negative concepts are not located on a single and continuous dimension. For instance, "striving for more health" is only identical in part with "reducing sickness" as public medicine slowly begins to understand. In those cases in which the positive goals and the negative avoidance goals are not identical, the megapolicy distinction between striving for achievement of more of a positive goal and between striving for reducing the negative as a goal is of much importance. This is especially the case because often it may be easier to achieve agreement on avoidance of a bad situation than on moving

towards a "good" situation. For instance, it is much easier to get agreement and action on avoiding total nuclear war than on realizing a "good" international system (of which nuclear war avoidance is only one characteristic). Therefore, a megapolicy of minimum avoidance in which one tries to move from a worst possible situation to a worst plus one, worst plus two, and so on, is very important and often optimal.

- (h) Time preferences. The common management sciences assumptions of positive interest rates and discounting of the future are of limited validity for more complex policy issues. Thus, because of ideological preference and/or need expectations, the future may receive priority over the present. Policy analysis must, therefore, face not only issues in which "interest rates" are heterogeneous, but interest rates will also, in part, be negative and noncontinuous. Indeed, the very terms of "interest" and "discount" rates may be quite inappropriate when we deal with future-directed ideologies, commitments to self-sacrifice, and similar phenomena. Therefore, an important megapolicy dimension is establishment of time preferences and yardsticks for comparing results located at different points of the time stream.

2. Value Sensitivity

A main problem-cluster of policy analysis involves value questions. This includes the quite well-recognized (though

unsolved) problem of individual multi-dimensional utility functions which can neither be aggregated nor compared. But also included are a number of much more complex value issues, which are ignored by contemporary management sciences. These include:

- (a) Compact ideologies. Much of contemporary United States economics and management sciences value theory assumes trade-offs between different goals, permitting side payments and enabling some uses of "Pareto Optimum" as a choice criterion. But when compact ideologies exist, values assume more of a "either all or nothing" form, trade-offs within dogma-structured goals is difficult and Pareto Optimum may become logically irrelevant. This is the case, for instance, when an ideology requires someone else to be worse off.
- (b) Latent values, motives and needs -- which often serve as the main reason for some activities and policies, but which cannot -- and often should not -- be explicated. Catharsis of emotions, coalition maintenance, ritualistic reinforcement of solidarity and symbolic functions -- these are some illustrations of important "goals" of policies that would often be impaired by explication.
- (c) Irreducible absolute values, which cannot be reduced to some basic common denominators and which therefore cannot be treated through trade-off approaches. Especially, contradiction between absolute values pose dilemmas that are universal in real-life policy sciences, while being ignored by most of management sciences.

- (d) the meanings and dimensions of basic social values, such as "freedom," "democracy," "equality," "participation," "human rights," etc. It is impossible to take up any complex policy issue without handling these values.

Therefore, the complete neglect of ethics and political philosophy in management sciences is a main weakness.

To try and overcome these weaknesses, policy analysis must include both substantive material from applied ethics and political philosophy and advanced methodologies for handling value issues. Forgoing value sensitivity testing, early involvement of legitimate value judges (including participating citizen, in addition to politicians) and bias-reducing redundancy in the analysis process itself are some illustrations of possible approaches to the value issues.

3. Operational Code Assumptions

The concept of "operational code assumptions" belongs to the policy analysis of issues involving inter-actor relations, in which understanding and predicting the behavior of various actors (individuals, groups, organizations, nations, etc.) is of high importance. Especially significant classes of such policy issues are foreign relations and military strategies; but a majority of, if not all, main social policy issues involve multiple actors and require -- for better policymaking -- prediction of behavior under various contingency conditions. Therefore, operational code assumptions are a very important policy analysis concept.

The concept of "operational code" is already somewhat developed, though insufficiently used.⁶ But its utilization in policy analysis requires further sophistication of the concept of operational code, especially in respect to the underlying assumptions on which efforts to formulate operational codes are based. Much more apperception is needed to bring out the possibilities of explaining given behavior patterns in terms of quite different models or operational codes,⁷ and thus to avoid the tendency of analysis to view all operational codes as slight variations of those known to the involved analysts from personal experience. This danger is especially acute the more analysts are immersed in rationality approaches, as inability to realize that behavior can follow quite different underlying rules is a highly dangerous trained incapacity, widespread in management sciences.

This problem has significant implications for the training and development of analysts, including, for instance, the need to expose them to direct experiences with different life styles and ideologies. Limiting myself to the concepts of policy analysis, at least the following points must be emphasized:

- (a) Operational code assumptions must be multiple, including alternative codes explaining actual behavior. Care must

⁶See Alexander George, "The Operational Code; A Neglected Approach to the Study of Political Leaders and Decisionmaking," *International Studies Quarterly*, Vol. 13, No. 2 (June 1969), pp. 190-222.

⁷A very good illustration is provided by Graham T. Allison, "Conceptual Models and the Cuban Missile Crisis," *American Political Science Review*, Vol. LXIII, No. 3 (September 1969), pp. 689-718.

be taken not to follow Occam's Razor and not to accept *a priori* simpler explanations -- such as "economic man models."

- (b) Operational code assumptions provide one of the important points of entry for behavioral science knowledge, namely different models for describing and sometimes explaining and predicting behavior. For instance, organization theory is essential for dealing with behavior of bureaucratized entities -- such as governments.
- (c) As behavioral sciences knowledge does not provide highly reliable explanations and predictions of behavior, additional sources of "understanding" must be utilized in policy analysis. These include, for instance, depth psychology and, on a different level, insightful literature.⁸
- (d) Special care must be taken to overcome cultural bias in dealing with behavior of actors who do not share the same culture. Thus, in the United States, policy analysis must be on guard against tendencies to regard all behavior as low-risk taking, without ideological commitments, based on a benefit-cost quasi-economic frame of appreciation and lacking aggressive values.⁹

⁸A fascinating treatment of the importance of literature for understanding behavior of one type of units -- bureaucracies -- is provided in Dwight Waldo, *The Novelist on Organization and Administration: An Inquiry into the Relationship Between Two Worlds* (Berkeley: Institute of Governmental Studies, 1969).

⁹In a forthcoming work tentatively called *Crazy States* I am examining contemporary American strategic doctrines and do reach the conclusion that most of them tend to be biased in these directions.

4. Political Feasibility¹⁰

Political feasibility -- in relation to policy analysis -- can be defined in three closely interdependent ways, as (a) relating to an actor; (b) relating to a policy-alternative; and (c) relating to a policy-area.

- (a) From the point of view of any actor (individual, group, organization, nation, etc.), political feasibility refers to the space of effective political action within which the actor is able, with a certain probability, to affect reality -- including, among other activities, to influence policies and their implementation. In this sense, political feasibility is closely affiliated with the concepts of "influence" and "power." The term "political leverage" can be used to refer to this ability of an actor to influence (among other phenomena) policies and their implementation (including, sometimes, to make and implement policies on his own). A derived term is "politician leverage domain," which refers to the action-space within which an actor has political leverage.
- (b) Political feasibility as regards a defined policy-alternative deals with the probability (or range of probabilities) that within a given time policy-alternatives

This has fargoing implications for strategic doctrines in respect to issues such as deterrence, arms control, A.B.M., nuclear proliferation and intervention.

¹⁰This section borrows in part from my more extensive discussion in "The Prediction of Political Feasibility," *Futures*, Vol. 1, No. 4 (June 1969), pp. 282-288. (Earlier version RAND paper P-4044, January 1969.)

will receive sufficient political push and support to be approved and implemented.

- (c) In relation to a policy-issue or a policy-area, political feasibility refers to the range within which alternatives are politically feasible. The term "political feasibility domain" can be used to refer to this range of alternatives.

Policy analysis is particularly concerned with the prediction of political feasibility in respect to defined policy-alternatives; and with identifying political feasibility domains to help and guide search for alternatives. The Delphi method¹¹ can be utilized here as a main technique, as can various consultation forms with politicians and politics-related persons.

Having proposed political feasibility as a policy analysis concept, I would like to add a word of warning, which applies in some degree to all policy analysis and also to management sciences as a whole. This warning does not relate to the obvious unreliabilities of the proposed method or the uncertainty of all predictions based on them. What really worries me is a much more fundamental danger, namely, the danger that every political feasibility prediction tends to ignore the capacities of human devotion and human efforts to overcome apparently insurmountable barriers and to achieve not only the improbable but the apparently impossible. A good policy may be worth fighting for, even if its political feasibility seems to be nil, as devotion and skillful efforts may

¹¹The Delphi method, as developed at RAND, is described by its main inventor, Olaf Helmer, in *Social Technology* (New York: Basic Books, 1966).

well overcome political barriers and snatch victory out of the mouth of political infeasibility. Any political feasibility estimate, however carefully derived and however correct at its time must, therefore, be regarded as provisional, sometimes to be taken up as a challenge rather than accepted as an absolute constraint. In this respect, political feasibility well illustrates the basic orientation of policy analysis, to serve as an aid in high-level heuristic policymaking, but not as a decision-determining algorithm or a set of self-fulfilling predictions.

5. Policy Analysis Network

A main problem of policy analysis is how to put together its manifold concepts and dimensions and present a coherent and meaningful analytical study of a discrete policy issue. Especially the absence of commensurate quantitative expressions that can be aggregated into a limited number of easily comprehensible findings poses a major difficulty. One of the integrating concepts that permits systematic presentation of a policy analysis study in a form that is meaningful for policymaking is a policy analysis network. A policy analysis network constitutes a morphological breakdown of a policy issue into a set of interrelated sub-issues in a form conducive for a decisionmaking program. Such a network presents the logical sequences of the analysis, clearly explicates the various alternative assumptions, and exposes the full complexities of the issue. The main events in the network consist of the sub-decisions involved in the policy, the interdependencies between the various sub-decisions being represented by the structure of the network.

Main features of a policy analysis network should include:¹²

- (a) Full explication of all assumptions, value and goal elements, and uncertainties; and full explication of the utilized techniques and theories, with clear identification of their reliability and validity.
- (b) Presentation of a range of assumptions, value and goal elements, predictions, techniques and theories -- and explicit parallel analysis using this range, with clear findings on the sensitivity of conclusions to those variations.
- (c) Full and explicit treatment -- with alternative assumptions, etc. -- of all policy analysis concepts, with the help of a multiplicity of techniques. Aggregation of inconsistent findings arrived at by different techniques should be explicated.
- (d) Closely related to b and c: Multiple policy-alternative elaboration, permitting the users of the analytical study to select an alternative approximating best his subjective judgment on all elements that are not purely scientific in their nature.
- (e) Identification of main interconnections with other issues and systems, with some elaboration of possibilities to redefine the problem by changing the delineation of the target system.

¹²For an illustration, see my forthcoming paper, *Policy Analysis for Long Range Transportation Decisionmaking* (Santa Monica, California: The RAND Corporation, 1970).

- (f) Open-ended, with indication of main avenues for search for additional alternatives, for changes in considered time-spans and for other approaches to the issue.
- (g) Embedment in the broader perspectives of policymaking, with special attention to improvements in the relevant policymaking system, in evaluation and feedback nets, and in implementation capacities. These improvements to be explored as essential requisites of new policies, as helpful conditions for new policies, or/and as alternatives to immediate changes in policy (as will be discussed soon).

Policy analysis networks can be presented with a variety of visual aids, graphic descriptions, issue mappings and sometimes computer simulation. The form of a policy analysis network can and should be adjusted to different audiences, ranging from professional analysts to mass media of communication.¹³ Special attention should also be given to develop policy analysis networks directed at politicians¹⁴ and senior executives. In all versions, the variance is in degrees of elaboration and details. The basic features, as enumerated above, must not be impaired.

¹³The presentation of policy analysis networks of controversial public issues on T.V. raises fascinating possibilities of significantly improving exposition of problems before the public and trying to advance on the stony road to realizing the requisite of democracy called "enlightened public opinion." Interesting possibilities also exist in respect to utilization of policy analysis networks when teaching citizenship, contemporary problems, and social sciences in schools.

¹⁴For an Israeli illustration, see Yehezkel Dror, "Proposed Policymaking Scheme for the Knesset Committee for the Examination of the Structure of Elementary and Post-Elementary Education in Israel -- An Illustration of a Policy Analysis Memorandum," *Socio-Economic Planning Sciences*, Vol. 3, No. 1 (June 1969), pp. 13-24. (Earlier version RAND paper P-3951, October 1968.)

ENHANCEMENT STEP TWO:
TOWARDS POLICYMAKING SYSTEM IMPROVEMENT

Policy analysis, including megapolicy analysis, is an important step in enhancing the capacity of management sciences to contribute to better policymaking on complex issues. But, unless attention is given to the improvement of the policymaking system as a whole, better methods for identifying preferable policies and megapolicies in discrete cases are of very limited usefulness. This indeed was one of the main conclusions from the efforts in Israel to improve decisionmaking through introduction of a combination between PPBS and policy analysis in a number of ministries. It quickly became clear that simultaneous improvements in a number of features of the policymaking system are essential for achieving a viable and significant impact.

The reasons for this fact can be summed up as follows, going from the particular to the general:

1. Innovative policy recommendations coming from policy analysis have little chance of being carefully considered, adopted, implemented and revised unless the policymaking system develops new capacities for creativity, consideration, implementation and feedback. Also required are significant relaxations of present constraints on policies including, in particular, political and organizational constraints. New patterns of decisionmaking are needed, which in turn require changes in most of the elements of the policymaking system, including personnel, structure, "rules of the game," equipment, and perhaps most important of all, "policymaking culture."

2. Because of the interdependencies between different policies, improvement of individual policies is of limited utility unless synergetically related to suitable adjustments in other policies. This requires improvements in the output of the policymaking system in respect to a large number of policies, which in turn can be achieved only through changes in the performance of the policymaking system as a whole.

3. A single policy decision, even an important one, is after all only a minor event in the ongoing process of issue recognition, policymaking resources allocation, policy decision, implementation, various forms of feedback, contextual change, issue reformulation, and so on. In other words: policymaking is an ongoing activity. Therefore, improving the overall policymaking capacity of the policymaking system is more important than improving any single policy. In cost-effectiveness terms: investing limited resources into improving the policymaking system rather than into improving a single policy decision is often much more cost-effective.

These three reasons together constitute, I think, an overwhelming case for improving the policymaking system, both as a main requisite for getting single policies improved and, more important, for achieving long-range improvements in respect to as yet unforeseen but surely critical policy issues of the future.

Management sciences does provide a very useful frame of appreciation for approaching the improvement of the policymaking system, namely a systems approach. Adopting a very simple general systems model, we can regard policymaking as an aggregative process in which

a large number of different units interact in a variety of part-stabilized but open-ended modes. In other words, policy is made by a system, the policymaking system.

This system is a dynamic, open, non-steady state and includes a large variety of different and changing multi-role components interconnected in different degrees and through a multiplicity of channels; it is closely interwoven and overlapping with other systems (e.g., the productive system, the demographic-ecological system, the technological and knowledge system, and the cultural system), and it behaves in ways which defy detailed modeling.

Even such a very simple systems perspective of public policymaking leads to three important improvement-relevant conclusions:

(a) As policy is a product of complex interactions between a large number of various types of components, similar changes in the output (or similar "equifinal states") can be achieved through many alternative variations in the components. This means, for our purposes, that different combinations of a variety of improvements may be equally useful in achieving equivalent changes in the quality of policymaking. This is a very helpful conclusion, because it permits us to pick out of a large repertoire of potentially effective improvements those that are more feasible under changing political and social conditions. This view also emphasizes the open-ended (or, to be more exact, "open-sided") nature of any search for improvement-suggestions: there is, in principle, unlimited scope for adventurous thinking and invention.

(b) A less optimistic implication of a systems view of policymaking is that improvements must reach a critical mass in order to

influence the aggregative outputs of the system. Improvements that do not reach the relevant impact thresholds will, at best, be neutralized by countervailing adjustments of other components (e.g., a new planning method may be reacted to in a way that makes it an empty ritual), or, at worse, may in fact reduce the quality of overall policy (e.g., through possible boomerang effect, reducing belief in capacity of human intelligence, with possible retreat to some types of mysticism, leader-ideology, etc., or by implementing wrong policies more "efficiently," and thus reducing an important social protective mechanism -- inefficiency as diminishing the dangers of implementation of wrong decisions and as permitting slow and tacit learning).

(c) The third, and again optimistic, implication of a systems view of policymaking is that thanks to the interactions between different system components, it may be possible to achieve the threshold of overall system output effects through a combination of strategic changes in controlling subcomponents, each one of which by itself is incremental. In other words, a set of incremental changes can in the aggregate result in fargoeing system output changes. Furthermore, because we are speaking about changes in the policymaking system, there may be a good chance that a set of relatively minor and quite incremental changes in the policymaking system will permit -- through multiplier effects -- fargoeing innovations in the specific policies made by that system. This possibility is of much practical importance, because of the much greater feasibility of incremental change than of radical change in the United States policies. (Though, I think, the readiness to innovate is increasing rapidly as a result of shock effects of highly perceived crises symptoms.)

The systematic design, analysis, and evaluation of policymaking-system improvements is a main challenge, which cannot be met by contemporary management sciences. What is needed, in addition to the changes involved in the move towards policy analysis, is fargoin fusion between the management sciences frame of appreciation and the main approaches and body of behavioral sciences -- including especially political sciences and public administration. But this is insufficient: we just do not have the knowledge and methodologies to take up redesign and novadesign of the policymaking system. Such redesign and novadesign requires concepts, models, facts, and ideas that are not only unavailable, but are, I think, beyond reach of the basic paradigms of contemporary management sciences, as well as of contemporary behavioral sciences.

But before taking the next and more radical step of proposing a "scientific revolution," resulting in a new type of policy sciences, let me concretize the idea of policymaking-system improvement with a number of concrete proposals, which are based on a combination between policy sciences theory¹⁵ and concrete experience in Israel.¹⁶ In no particular order, the following few tentative subjects for research and recommendations illustrate issues of policymaking-system improvement, which are far beyond the domain of management sciences:

¹⁵ See Yehezkel Dror, *Public Policymaking Reexamined* (San Francisco: Chandler, 1968).

¹⁶ On the basis of additional work in the United States, I have transformed these recommendations into U.S.-relevant suggestions. English versions of some of the Israeli proposals -- which of course reflect only my personal opinion -- are published in *Futures* (1970, in press). For some other of my proposals and background material on the Israeli experience, see Rand Paper P-4050 (March 1969) and my article, "Policymaking Improvement: Some Israeli Experience and Its Implications," in Garry Brewer and Ronald Brunner, ed., *Approaches to the Study of Political Development* (N.Y.: The Free Press, 1971, forthcoming).

1. Systematic evaluation of past policies in order to learn from them for the future. For instance, methods and institutions to provide an independent audit of the results of legislation every five years.

2. Better consideration of the future. Special structures and processes to encourage better consideration of the future in contemporary policymaking. These include, for instance, dispersal of various kinds of "lookout" organizations, units, and staff throughout the social guidance cluster, and utilization of alternative images of the future and scenarios in all policy considerations.

3. Methods and means to encourage creativity and invention in respect to policy issues. For instance, no-strings-attached support to individuals and organizations engaging in adventurous thinking and "organized dreaming"; avoidance of their becoming committed to present policies and establishments; and opening up channels of access for unconventional ideas to high-level policymakers and to the public at large. Creativity and invention may also be influenced within policymaking organizations by institutionally protecting innovative thinkers from organizational conformity pressures. Also requiring careful study are creativity-amplifying devices and chemicals and arrangements for their possible use in policymaking.

4. Improvement of one-person-centered high-level decisionmaking. Even though of very high and sometimes critical importance, one-person-centered high-level decisionmaking is very neglected by management sciences. This in part is due to difficulties of access, on one hand, and dependence of such decisionmaking on the personal characteristics

and tastes of the individual occupying the central position and the consequent difficulties in improving such situations, on the other hand. But neglect of the study and improvement of one-person-centered high-level decisionmaking is in the main a result of a lack of suitable research methods, conceptual frameworks, and instrumental-normative models in contemporary management sciences. With the help of novel approaches, one-person-centered high-level decisionmaking can be improved. Thus, many conditions of better decisionmaking can be satisfied by a variety of means, some of which may often fit the desires of any particular decisionmaker; E.g., information inputs, access of unconventional opinions, feedback from past decisions, and alternative predictions can be provided by different channels, staff structures, mechanical devices, communication media, etc. This multiplicity of useful arrangements provides sufficient elasticity to fit the needs, tastes, preferences, and idiosyncrasies of most, if not all, top decisionmakers.

5. Development of politicians. The idea of developing the qualifications of politicians is regarded as quite "taboo" in Western democratic societies. Certainly it is not faced in management sciences nor in modern political sciences. But this is not justified. The qualifications of politicians can be improved within the basic democratic tenets of free elections and must be improved so as to increase the probabilities of good policymaking and to build a new symbiosis between "power" and "knowledge." Thus, for instance, politicians need an appreciation of longer-range political, social, and technological trends, need capacities to consider metapolicies, and should be able

critically to handle complex policy analysis networks. One possible approach to the problem is to encourage entrance into politics of suitably qualified persons and to vary the rules of presentation of candidates to permit better judgment by the voter. Other less radical proposals are to establish suitable programs in graduate schools where many future politicians study (such as law schools), and to grant to elected politicians (e.g., members of a state legislature) a sabbatical to be spent in self-developing activities, such as studying and writing. Suitable programs can be established at universities and at special centers for active politicians to spend their sabbaticals in a productive and attractive way.

6. Radical changes in the school teaching of "good citizenship" and current affairs subjects. In the longer run, better preparation of the citizen for his roles in policymaking is of critical importance. A first and relatively easy step to meet urgent needs is far-reaching change in the teaching of all "good citizenship" subjects in the elementary and high schools -- in the direction of developing individual judgment capacities, learning information search and evaluation habits, and increasing tolerance for ambiguities, as well as readiness to innovate. Intensive use of new teaching methods, such as gaming and projects, and full exposition to contradicting points of view may be helpful in the desired directions. Also to be studied are possible needs and ways for reform of the teaching of various subjects (and of relevant teacher preparation) so as to introduce pupils early to a "policy oriented" view of reality and problems.

7. Establishment of a multiplicity of policy research organizations

to work on main policy issues. Some of these policy research organizations would work for the central government, some for the legislature and some for the public at large, diffusing their findings through the mass media of communications. Some policy research organizations should also operate on the multi-national and the international level.

8. Development of extensive social experimentation designs and of institutions able to engage in social experimentation (including reconsideration of involved ethical problems). It seems quite clear that social experimentation is essential for finding solutions to present and emerging social issues. Careful social experimentation requires invention of new research designs and of new legal-political arrangements. Also important and very difficult is the requirement for a political and social climate in which careful research and experimentation on social institutions is encouraged.

9. Institutional arrangements to encourage "heresy" and consideration of taboo policy issues, such as the possibilities of long-range advancement of humanity through genetic policies and of changes in basic social institutions, such as the family.

These nine examples are really intended to serve only as illustrations. To evaluate them, to identify additional policymaking-improvements, and to apply them to a concrete system is a task requiring new scientific foundations.

POLICY SCIENCES AS A NEW SCIENTIFIC FOUNDATION

From the point of view of human action, scientific knowledge can be divided into three main levels: knowledge relevant to the control¹⁷ of the environment; knowledge relevant to the control of society and individuals; and knowledge on the direction of the controls themselves, that is, on *meta-control*.

Knowledge on control of the environment, as supplied by rapid progress in the physical sciences, is the most highly developed one. Knowledge on control of society and individuals is much less advanced, but at least the life sciences and behavioral sciences constitute recognized components of science, receive significant support, and do show some signs of progress. Least developed of all and only recently recognized as a distinct focus for research and study are meta-control knowledge, that is, knowledge on the design and operation of the control system itself.

Scarcity of knowledge on design and operation of the social overall control system -- which I call the policymaking system -- accompanied humanity since its beginnings. While some progress has taken place in the mechanics of control and in the micro-control systems of some components of society (such as corporations), the essential features of the policymaking system continue to be beyond penetrating understanding and even more so, beyond conscious and deliberate design and direction.

This blind area in human knowledge has always caused suffering and tragedy, in terms of human values. But, from a longer time

¹⁷I am using the term "control" in the sense of regulating, governing, shaping, directing, and influencing. "Monitoring" is one sub-element of "control," in the broad sense in which I use the latter.

perspective, the weaknesses of the policymaking system did not matter very much as long as the operations of that system did not constitute an important variable in shaping human destiny. When most variables shaping human and social fate were beyond influence by the policymaking system because of the absence of powerful policy instruments, bad decisions on the use of the few available instruments (or, to be more exact, "instrument images") had only very limited impact on basic reality and therefore could not cause long-range harm.

It is this insignificance of policymaking systems for the long-range fate of humanity that is changing, thanks to rapid progress in knowledge on policy instruments, which permits control of environment, society, and individuals. New knowledge supplies increasingly potent instruments for use by humanity. The nuclear bomb and ecology-poisoning techniques and materials are but weak illustrations of the powerful policy instruments supplied by modern science. Presetting of the gender of children, weather control, genetic engineering, stimulation of altered states of consciousness and emotion controls -- these are only some illustrations of the more powerful capacities for controlling the environment, society, and individuals that the progress of science is sure to supply in the foreseeable future.

It is the growing gulf between capacity to control the environment, society, and individuals on one hand, and knowledge on how to design and operate policymaking systems so they can use the capacities on the other hand, which constitutes the major danger to the survival and development of humanity. The emergence of *directing man*, who exerts dominance over his environment, over social institutions and

over the very nature of human beings, makes it absolutely essential to improve policymaking systems so as to use wisely the powerful instruments at his disposal.

I use on purpose the term "wisely" to emphasize the multidimensionality of required changes in policymaking systems. Urgently needed are, for instance, new values and belief systems that meet the new global role of *directing man*. Scientific knowledge cannot supply new values and belief systems,¹⁸ though some of the conditions of value innovation can be studied and consciously encouraged. But science can and should supply knowledge on preferable designs and patterns for the rationality components of policymaking systems, including rational means for improving the designs and patterns of the essential extra-rationality components.

In short, a main problem faced by humanity can, I think, be summed up in what I aphoristically call the Second Dror Law:¹⁹

While human capacities to shape the environment, society, and human beings are rapidly increasing, policymaking capabilities to use those capacities remain the same.

Many dispersed efforts to develop knowledge relevant to policymaking improvement do occur. These include, in particular,

¹⁸For somewhat different and stimulating views, see Hazan Ozbekhan, "Toward a General Theory of Planning," in Erich Jantsch, ed., *Perspectives of Planning*, Paris: OECD, 1969, and Erich Jantsch, "From Forecasting and Planning to Policy Sciences," *Policy Sciences*, Vol. 1, No. 1, Spring 1970, in press.

¹⁹The First Dror Law states aphoristically: *While the difficulties and dangers of problems tend to increase at a geometric rate, the knowledge and manpower qualified to deal with these problems tend to increase at an arithmetic rate.*

work done within management sciences, which, as already pointed out, pioneers the development of prescriptive methodologies for better decisionmaking. Relevant work also takes place within more traditional disciplines, especially economics, some branches of psychology, and some parts of political science.²⁰ This work supplies important insights, promising concepts, and stimulating ideas. But, in general, present endeavors to develop scientific knowledge relevant to the improvement of policymaking tend to suffer from the following weaknesses, in addition to the specific inadequacies of management sciences discussed earlier (see pp. 5-6 above).

a. Micro approach, with applications to some types of decisions, but very limited relevance to the policymaking system as a whole.

b. Disjointedness, resulting in fragmented views limited to single dimensions of policymaking. Thus, systems analysis is quite isolated from organization theory, operation research from psychology of judgment, and decision theory from general systems theory.

c. Preoccupation with the rationality components of policymaking, with little attention to the fusion of rationality with extrarationality and the improvement of the latter.

d. Incrementalism, with nearly complete neglect of the problems of policymaking systems nova-design (i.e., design anew), as distinguished from slight redesign.

²⁰For selected bibliographic references to relevant work until 1967, see "Bibliographic Essay" in Yehezkel Dror, *Public Policymaking Reexamined*, op. cit., pp. 327-356. For a survey of more recent relevant literature, see Yehezkel Dror, "Recent Literature in Policy Sciences," *Policy Sciences*, Vol. 1, 1970, forthcoming.

e. Narrow domain of concern, which neglects consideration of possible improvement needs and improvement possibilities of some critical elements of the policymaking system, such as politicians.

f. Sharp dichotomy between the behavioral approaches, which study some segments of policymaking reality, and the normative approaches, which design abstract rationality-based micro-decision models; therefore, no comprehensive approach to understanding and improvement of the policymaking system as a whole.

g. In the behavioral sciences: lack of interest in prescriptive methodology and jumps between lack of interest in application and partisan advocacy.

h. Fixation on conventional research methods and therefore inability to utilize important sources of knowledge (such as tacit knowledge of policy practitioners) and difficulties in designing new research methods to meet the special problems of policymaking study and improvement (e.g., social experimentation).

I could go on adding items to the list of inadequacies of most contemporary efforts, including management sciences, to build up policymaking knowledge. But I think the problem goes beyond a shorter or longer list of discrete weaknesses. The problem is not one of accidental omissions, which can be easily corrected. Rather, I think that the overall lack of saliency of contemporary scientific endeavors to the improvement of policymaking reflects a basic incongruency between the paradigms of management sciences, and indeed all contemporary sciences in all their heterogeneity, and the paradigms necessary for building up policymaking-relevant scientific knowledge.

To put my opinion into a positive form, it seems to me that in order to build up a science of policymaking, we need a new type of science based on a new set of paradigms.²¹ Following the pioneering suggestion of Harold D. Lasswell,²² I propose to call this new area of study, research, teaching, professional activity and application "policy sciences"; but the name does not really matter.

As a matter of fact, policy sciences are at present in *status nascendi* and hopefully approach a taking-off stage. Among the signs of their emergence, let me mention the following:

a. The development of research and study of various policymaking issues within new and traditional disciplines, and -- in particular -- the development of management sciences and their fast progress. This testifies to widespread interest and serves to build up important, though disjointed, subcomponents of policy sciences.

b. The invention and development of new types of policy research organizations that in effect engage in the development and application of policy sciences.²³ The Hudson Institute, the Urban Institute, parts

²¹My terminology follows Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press, 1962.

²²The concept of "policy sciences" was first proposed in 1951 by Harold D. Lasswell, in Daniel Lerner and Harold D. Lasswell, eds., *The Policy Sciences: Recent Developments in Scope and Methods*, Stanford: Stanford University Press, 1951. For recent versions of Lasswell's views, see Harold D. Lasswell, "Policy Sciences" in *International Encyclopedia of Social Sciences*, Vol. 12, pp. 181-189, and Harold D. Lasswell, "The Emerging Conceptions of the Policy Sciences," *Policy Sciences*, Vol. 1, No. 1, 1970, in press. The subject will be extensively treated in a forthcoming book by Harold D. Lasswell, *A Preview of Policy Sciences*.

²³For an excellent discussion, see Roger E. Levien, *Independent Public Policy Analysis Organizations: A Major Social Invention*, The Rand Corporation, P-4231, November 1969.

of the Brookings Institution, the new Woodrow Wilson Foundation, the Institute for the Future, The Rand Corporation, and the New York-Rand Institute illustrate this trend in the United States.

c. The self-education of outstanding individual policy scientists who, thanks to personal multidisciplinary background, accidents of opportunity, and interest in application of scientific methods to acute problems, got into the pioneering of policy sciences and thus demonstrate the feasibility of policy sciences and its promises.

d. The recent establishment of new university programs devoted to policy sciences, with or without use of that term. In the United States alone, more than ten such programs were initiated during the last two or three years.²⁴

e. The rapidly increasing number of conferences, books, periodicals, "invisible colleges," and similar expressions of professional activity and interest devoted in effect to the advancement of policy sciences as a whole or of some of its major aspects.²⁵

²⁴The graduate university programs about which I happen to know include, in no particular order: The program in public policy at the John F. Kennedy School at Harvard University; the Doctoral Program in Policy Sciences at the State University of New York at Buffalo; the Graduate School of Public Affairs at the University of California, Berkeley; the Doctorate Program in Social Policy Planning, also at the University of California, Berkeley; the Graduate Program in Planning at the University of Puerto Rico; the Institute for Public Policy Studies at the University of Michigan; the School of Urban and Public Affairs at Carnegie-Mellon University; the Doctorate Program in Public Policy Analysis at the Fels Institute of Local and State Government at the University of Pennsylvania; the Program in Planning and Policy Sciences, also at the University of Pennsylvania. Also moving in the same direction seem to be the Lyndon B. Johnson School of Public Affairs at the University of Texas, a proposed Center for the Policy Sciences at Brown University, and a proposed new school at the University of Hawaii.

²⁵To illustrate, let me mention some relevant, recently founded periodicals: *Futures*, *Long-Range Planning*, *Policy Sciences*, *The Public Interest*, *Public Policy*, *Socio-Economic Planning Sciences*, *Social Policy* and *Technological Forecasting*.

These are some of the signs of search, concern, experimentation, and interest that, I think, indicate the emergence of policy sciences. Nevertheless, at best, we are only in the first stages of the required scientific revolution and there is no assurance that it will be successful in bringing forth a viable and significant new kind of science. The challenge may be beyond our intellectual abilities; charlatans may discredit the idea of policy sciences before it really gets started; political culture may inhibit the efforts; or the conservatism of "normal" scientists, including management scientists, may choke it. Even if policy sciences do emerge as a new type of scientific endeavor, it is doubtful in how far one can predict now their future characteristics and implications. Therefore, the following exploration of the new paradigms of policy sciences and of their applied implications should be regarded as a normative forecast, directed at least as much at shaping the future as at foreseeing it.

Subject to this qualification, I think that preliminary examination of some of the unique paradigms of policy sciences, as I see them, will serve to illuminate both the current effort and the urgent need. It will also serve as a basis for indicating some implications for management sciences. As our analysis is a rough one, mistakes in some specifications do not matter. It is the overall *gestalt* of policy sciences in which we are interested.

It seems to me that the main paradigmatic innovations to be required of and expected from policy sciences can be summed up as follows:²⁶

²⁶This and the following section lean in part on Yehezkel Dror, "Prolegomenon to Policy Sciences," *Policy Sciences*, Vol. 1, No. 1, Spring 1970, pp. 135-150. (Earlier version, The Rand Corporation, P-4283, January 1970.)

a. The main concern of policy sciences is with understanding and improvement of macro control systems, that is, policymaking systems. In addition to overall improvement-oriented study of such systems, main foci of policy sciences include, for example: (1) policy analysis, which we have already discussed (see pp. 11 ff. above); (2) master policies, which we have also already discussed (see pp. 16 ff. above); (3) alternative innovation, which deals with the invention of new designs and possibilities to be considered in policymaking; (4) evaluation and feedback, including, for instance, social indicators, social experimentation, and organizational learning; and (5) improvement of the policymaking system through redesign and novadesign of its components, as already discussed (see pp. 30 ff. above). While the main test of policy sciences is better achievement of considered goals through more effective and efficient policies, policy sciences as such is in the main not directly concerned with the substantive contents of discreet policy problems (which should be dealt with by the relevant normal sciences), but rather with improved methods, knowledge, and systems for better policymaking.

b. Breakdown of traditional boundaries between disciplines, and especially between the behavioral sciences and management sciences. Policy sciences must integrate knowledge from a variety of branches of knowledge and build it up into a supradiscipline focusing on policymaking. In particular, policy sciences is based upon a fusion between behavioral sciences and management sciences. But it also absorbs elements from physical and life sciences, engineering, and other disciplines insofar as they are relevant.

c. Bridging of the usual dichotomy between "pure" and "applied" research. In policy sciences integration between pure and applied

research is achieved by acceptance of the improvement of policymaking as its ultimate goal. As a result, the real world becomes a main laboratory of policy sciences and the test of the most abstract theory is in its application (directly or indirectly) to problems of policymaking.

d. Acceptance of tacit knowledge and personal experience as important sources of knowledge, in addition to more conventional methods of research and study. Efforts to distill the tacit knowledge of policy practitioners and to involve high-quality policymakers as partners in the up-building of policy sciences are among the important characteristics distinguishing between policy sciences and contemporary "normal" sciences, including management sciences.

e. Policy sciences shares normal sciences main involvement with instrumental-normative knowledge, in the sense of being directed at means and intermediate goals rather than absolute values. But policy sciences is sensitive to the difficulties of achieving "value-free sciences" and tries to contribute to value choice by exploring value implications, value consistencies, value costs, and the behavioral foundations of value commitments. Also, parts of policy sciences are involved in invention of different "alternative futures," including their value contents. Furthermore, "organized creativity" -- including value invention -- constitute important inputs into parts of policy sciences (such as policymaking-system novadesign and redesign, policy design and policy analysis), and encouragement and stimulation of organized creativity is therefore a subject for policy sciences. As a result, policy sciences should break a breach in the tight wall

separating contemporary sciences from ethics and philosophy of values and build up an operational theory of values (including value morphology, taxonomy, measurement, etc., but not the substantive absolute norms themselves) as a part of policy sciences.

f. Policy sciences are very time-sensitive, regarding the present as a "bridge between the past and the future." Consequently, it rejects the a-historic approach of much of contemporary behavioral and management sciences. Instead, it emphasizes historic developments on one hand and future dimensions on the other hand as central contexts for improved policymaking.²⁷

g. Policy sciences does not accept the "take it or leave it" attitude of much of contemporary behavioral sciences, neither does it regard petition signing and similar "direct action" involvements as a main form of policy sciences contributions as such (in distinction from scientists acting as citizens) to better policymaking. Instead, it is committed to striving for increased utilization of policy sciences in actual policymaking and to preparation of professionals to serve in policy sciences positions throughout the macro control system (without letting this sense of mission interfere with a clinical and rational-analytical orientation to policy issues). In this respect, it follows in the footsteps of management sciences.

²⁷ On the relations between futures studies and policy sciences, see Yehezkel Dror, "A Policy Sciences View of Futures Studies: Alternative Futures and Present Action," *Technological Forecasting*, Vol. II, No. 1, Winter 1971, in press. (Earlier version, The Rand Corporation, P-4305, February 1971.)

h. Policy sciences deals with the contribution of systematic knowledge and structured rationality to the design and operation of macro control systems. But policy sciences clearly recognizes the important roles both of extra-rational processes (such as creativity, "intuition," charisma, and value judgment) and of irrational processes (such as depth motivation). The search for ways to improve these processes for better policymaking is an integral part of policy sciences, including, for instance, possible policymaking implications of altered states of consciousness. (In other words, policy sciences faces the already mentioned paradoxical problem of how to improve extrarational and even irrational processes through rational means.)

SOME TENTATIVE IMPLICATIONS FOR MANAGEMENT SCIENCES

Clearly, the emergence of policy sciences is of far-reaching importance for management sciences. Detailed specification of impacts would be premature. But some implications can be tentatively indicated:

a. Policy sciences do not preempt management sciences, in the sense of taking their place or making them superfluous. Management sciences have their own important domain of applicability independent of policy sciences and should continue to develop. Furthermore, management sciences are and will continue to constitute one of the basic disciplines on which policy sciences relies and from which it draws essential inputs. Therefore, the continuous advancement of management sciences within its present paradigms is essential not only because of its direct utility for many types of problems, but because of its contributions to policy sciences.

b. Nevertheless, in order to broaden the perspective of management scientists and to permit them to work on interdisciplinary policy-oriented study teams, the teaching of management sciences should be broadened to include policy analysis and the fundamentals of policy sciences. This will require significant innovations in teaching, but without impairing the uniqueness of management sciences programs.

c. At the same time, management sciences will constitute one of the basic subjects of policy sciences teaching programs. My initial guess is, that about thirty percent of student efforts should be devoted to management sciences in an advanced policy sciences doctorate program.²⁸

²⁸ See Yehezkel Dror, "Teaching of Policy Sciences: Design for a Doctorate University Program," *Social Science Information*, 1970, forthcoming. (Earlier version, The Rand Corporation, P-4128-1, November 1969.)

Within large parts of the other teaching components, management sciences concepts and tools will be much utilized, but in a different context.

d. Social problems cannot wait till a new generation of professionals goes through graduate school, gains experience and can start to tackle them. Therefore, some crash programs to prepare management scientists for policy analysis and applied policy sciences activities are necessary. A one-year intensive program should be sufficient for those purposes.

e. Teaching and research in policy sciences will probably be located more at policy research organizations than at traditional university departments. This in turn may have feedback for management sciences research and teaching, larger parts of which may also become concentrated at policy research organizations.

f. With the diffusion of special policy analysis and policy sciences roles throughout the policymaking system and with the acceptance of policy sciences as a main contribution to better policymaking, the political and social roles of management sciences will also increase. This, on one hand, reinforces the requirement to prepare all management scientists for policy analysis; on the other hand, this will raise novel problems of professional ethics, which management scientists share with policy scientists.

It is well possible that, in the longer run, management sciences will develop into one of the subspecializations of policy sciences and merge into policy sciences as a whole. But, as yet, policy sciences

hardly exist, while management sciences have significant though narrow achievements to their credit. Therefore, it is policy sciences that need the support and encouragement of management scientists and their professional inputs, and not the other way around.

Policy sciences holds forth the hope of improving the most backward of all human institutions and habits -- policymaking and decision-making -- far beyond what is possible by management sciences. It constitutes a major attempt to assert and achieve a central role for rationality and intellectualism in human affairs and to increase by jumps the capacity of humanity to direct its futures. Important first steps to build up policy sciences are being attempted now. There is no assurance that these steps will lead anywhere and that the endeavor to build up policy sciences will succeed. But the expected benefits of policy sciences, and -- even more so -- the gloomy results of failure to advance policy sciences, make this endeavor into one of the most critical challenges ever faced by science. It is also one of the most difficult challenges because of the intrinsic difficulties of the subject, because of the needed revolution in scientific paradigms, and because of the far-going and in many respects radical implications. Therefore policy sciences needs and deserves all the help it can get, including first of all strong support and intense personal commitment from the community of management scientists.