DOCUMENT RESUME

ED 110 009 IR 002 279

AUTHOR Wilson, Albert; Wilson, Donna
TITLE Toward the Institutionalization of Change. Working Paper No. 11.
INSTITUTION Institute for the Future, Menlo Park, Calif.
PUB DATE Aug 70
NOTE 41p.
AVAILABLE FROM Institute for the Future, 2740 Sand Hill Road, Menlo Park, California 94025 ($3.00)

EDRS PRICE MF-$0.76 PLUS POSTAGE. HC Not Available from EDRS.
DESCRIPTORS Adoption (Ideas); Annual Reports; *Change Strategies; Changing Attitudes; Environmental Research; *Futures (of Society); *Institutional Role; Planning; Public Policy; *Social Change; Technological Advancement; *Yearbooks
IDENTIFIERS *Institute for the Future

ABSTRACT

In connection with plans for the publication of an annual series of reports on the "Future State of the Union," conceptual problems of such an undertaking are explored and some of the features to be included are examined. Philosophical prerequisites discussed include a model of change; a cybernetic model; some social indicators for change; and values, preferences and goals. Potential features of the proposed yearbooks explored include technological and environmental forecasts, discussions of highly predictive societal development, and surveys of critical situations and needs, and societal options. (SK)

Toward the Institutionalization of Change

Albert Wilson

Donna Wilson

INSTITUTE FOR THE FUTURE

WP-11

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Albert Wilson and Donna Wilson

The Institute for the Future
Middletown, Connecticut
August 1970

Working Paper WP-11.

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FOREWORD

The Institute for the Future, under a grant from the Russell Sage Foundation, is preparing plans for the publication of an annual series of reports on the Future State of the Union. This paper, which is part of that preparatory effort, is concerned with some of the underlying conceptual problems of such an undertaking and presents a discussion of some of the features that might be included in the yearbooks.

CONTENTS

INTRODUCTION

This generation as no generation before in history is consumed with change. The rapidity of technological change and its societal consequences have thrust us onto a metaphorical surfboard that renders obsolete the traditional movement from one state of static stability to another by discrete steps of renewal, reform, or revolution. Unless we can discover and apply processes leading to dynamic stability, present ecological, social, and psychological imbalances will continue to grow until they topple us. In brief, we must change our mode of change. Burke's warning that "a nation without means of reform is without means of survival" now becomes "a nation that does not continually reform its means of reform cannot survive." This challenge is recognized as is apparent in the increasing number of individuals and institutions concerned with the development of a "science of change". This new science, frequently called Futures Research or Futurology, is predicated on the belief that a spectrum of alternative probable futures exists and that through our own efforts, we can control the processes of change to enhance or diminish the probability of occurence of any specific future.

The development of a science of change is but part of the task of changing our mode of change. In addition are the problems of the broad application of the methodologies of futures research and their assimilation into public practice. Clearly the application of any science of the future that can be used to affect the shape of tomorrow's world poses basic problems for a democratic society. It is evident that the delegation of the power to select and implement choices among possible futures is as important to a sovereign citizenry as its delegation of the powers of government. While it is a matter of urgency to replace the present processes of change characterized by the haphazard injection of innovation into our social structure at an ever increasing rate, it is a matter of uncertainty whether new processes that permit the control of the direction and rate of change, subject to continuous re-evaluation on the basis of the quality of life they generate, can be found. It is even more uncertain whether such processes would be consistent with the principles of a democratic society. Hence, as the new science of futures research develops

its methodologies and begins to test them, we must give high priority to how the practice of a science of change may be properly incorporated so that participatory democracy will be preserved. We must be concerned with how we may organize the efforts to define and implement the future so that those who are to live in the future will participate in its choice. If the study and practice of futures research is to become institutionalized in American society, we must weigh carefully such matters as who are to be the practitioners of such research and how are they to be monitored and held accountable to the public.

One democratic approach to a strategy of incorporating the methods and results of futures research into public practice is to initiate a period of public familiarization with futures thinking so that concerned citizens can participate in the generation of alternative scenarios for the future and work with futures analysts in the exercise of establishing normative goals. A series of "Future State of the Union" yearbooks has been suggested as an experiment to provide such periods of familiarization. The proposed yearbooks could help citizens become future-oriented and provide the vehicle for citizen participation in futures research that is the prerequisite to democratic institutionalization of change on a national or global scale.

Prior to the design of a set of evolving yearbooks on the Future State of the Union, we must formulate design criteria and objectives. These criteria and objectives are necessarily related to the model of change we postulate, to the social descriptors we adopt, and to the value system to which we subscribe. Accordingly, it is important to preface our specific design considerations with a general exposition of philosophical viewpoints of change, social structure, and value systems. Because of the necessity to view the problem of the institutionalization of change on both a philosophical level and a design-strategy level, we have divided this paper into two parts. In the first part, we review general philosophical problems related to modeling of change, modeling of society, and selecting of goals. In the second part, we propose some candidate design features for the first-generation yearbooks derived from the boundary

conditions outlined in Part I. A specific proposal for conducting the requisite research and the compilation of yearbooks on the Future State of the Union will be the subject of a following report.*

*Olaf Helmer, *Report on the Future of the Future-State-of-the-Union Reports*, The Institute for the Future (Report in preparation).

PART I. SOME PHILOSOPHICAL PREREQUISITES

The question *What will the future be?* is perhaps older and certainly of more immediacy to man than such questions as *What are the stars?; What makes corn grow?;* or *What makes fire burn?* While the search for answers to the last three questions eventually resulted in the extended areas of systematic knowledge we now call astronomy, biology, and physics, the search for answers to the first question has never produced any dependable methodologies or basic principles. Only in the past few years have improvements in forecasting techniques and developments in control and correction concepts indicated that a first approximation to a systematic science of change may soon be available.

Until the experience of rapid change peculiar to our own age, the future has generally been considered to be the business of the future. This was recognized by legalists in previous ages by forbidding inheritances in perpetuity. This was recognized by the founding fathers in their dictum that "each generation must lead its own life, unexploited by dead men." This traditional American attitude to do what we want to do with little concern for the past is balanced by the equally traditional American attitude to do what we want to do with little concern for the future. Each generation must lead its own life unexploited by the unborn. This view has been reflected in the rapaciousness that has polluted the present. The recent reversal of indifference to the future is not due to a sudden upsurge of altruism, but rather to the visible backlash of our own acts. In an age of rapid change the consequences of our activities are thrown back into our own faces. We are brought to the necessity of restoring ecological balance because we ourselves, not our children or our children's children, have to live in the future we create. We now find that the choice to develop a science of change which allows us to choose among alternative futures has become an existential choice, and the strategy by which we may institutionalize change has become a strategy for survival.

MODEL OF CHANGE

Implicit in every forecasting technique and fundamental to the whole science of futurology is a model of change. Our experience with technical and social change suggests that a comprehensive model of change should allow

for determinative, normative, and random processes. Determinative processes are those that provide the recognizable patterns of social change. They are the processes such as the natural growth of economies, populations, and institutions that provide the continuity of society. Normative processes are those that have their origin in the needs, goals, and preferences of social groups and sub-groups and whose implementation bends the course of the determinative toward the chosen goals and increases their probability of occurrence. Random processes introduce discontinuities into the patterns of change, launching new sequences of events that may overrule established determinative and normative courses.

Forecasts of the probable future are primarily based on the extrapolation of existing trends, but forecasts can also be made by inference from evolutionary processes and by analogy with the past. Such forecasts are useful whether they are accurate or not. This is so because the proper function of a forecast is to illuminate the domain of normative choice, not to specify some predetermined end. The normative can only be effectively activated through challenging the determinative. If we believed the probable future forecast by the determinative to be unalterably deterministic, we would not challenge its predictions. The inaccuracies of our determinative forecasts supply the necessary credibility gap that supports our disbelief in their inevitability and hence motivates us to challenge the determinative through implementing our normative choices.

Determinative Aspects

The word "determinative" is employed to indicate those processes of change whose paths are deterministic except wherein they are modified by the normative pressures of human volition. It is possible that a determinative process may be totally deterministic, unmodifiable by any exercise of will. But in view of our extended ignorance of the nature of processes of change, wherever strict determinism has not been demonstrated, ~~it~~ is best that we act under the premise -- true or false -- that our choices and our wills can alter the future directions of any trend.

The primary problem of the determinative in futures research is to discover the basic patterns of social change and use these patterns to forecast the most probable future states of society that will develop accordingly. The primary methodology of the determinative is the extrapolation into the future of the magnitudes of quantitative statistical time series that have

been derived by fitting to past quantities. The trends indicated by these series are our best guides to the most probable determinative futures since technological, ecological or social trends seldom change direction abruptly.

Long-range determinative forecasting involves anticipation of the changes likely to occur in patterns of change. That is, long-range forecasting may be said to be forecasting that involves knowledge of higher-order derivatives. However, in view of the increasing role normative factors play in shaping the future, it is questionable that long-range determinative forecasting is useful. The proper encounter with the future is better described by a dialectical process: the forecasting of short-term determinative futures; the generating of normative responses; and the synthesizing of the interactions between trends and implemented norms.

Normative Aspects

The basis of the normative in social change is the belief that there exist alternative futures. It is the belief that we can create and choose alternatives guided by our imaginations, needs, and capabilities. The fundamental questions of the normative must not be posed simply as "what do we want and how do we go about getting it?" The normative process involves a distillation of our wants, needs, and values to provide us with goals; it involves the effects of attaining these goals on our future needs and wants and on our subsequent ranges of choice and potentialities for creating additional alternatives.

These general questions find specific expression when we ask ourselves how we guide and assess the creative and innovative forces in society. How do we choose the research to fund, the products to develop, the plans to implement? How do we establish priorities among competing objectives? How do we resolve the goals of conflicting interests? When should we meet deleterious trends innovatively, when should we use holding actions? Who is to decide on society's goals and priorities -- an elite oligarchy, the majority, or who else? The immediacy of these questions has given them answers that are used in practice, but their importance has not received its suitable recognition, namely, the development of a theory of choice based on relevant political, technological, and axiological considerations.

Two broad classes of normative considerations must be recognized. We may term these the conscious normative and the subliminal or reactive normative. The conscious normative deals with the selection of goals based on

recognized needs, wants, and values of the articulate portion of society or of the conscious portion of an individual. The subliminal normative acts as a pressure of dissatisfaction with trends and choices and is diffused throughout the inarticulate portion of society or the unconscious of the individual. It usually receives no coordina[illegible]sion until the pressure reaches a critical value. The primary [illegible]e for this pressure increase is that those who exercise normative choice are frequently not in communication with all portions of society or all individuals whom their choices affect.

Random Aspects

The primary premise of prediction is that the statistical properties of the universe in the future will be very much like those of the universe of the past. Forecasting and planning, the practice of science, and the accumulation of knowledge depend on this fundamental temporal continuity of the world. In general, the present does not inject a "jump discontinuity" in evolutionary trends. The jump discontinuity carried by the present is the jump from probabilities less than one to probability one; from the condition of "likely to happen" to the condition of "did happen".

But from time to time, discontinuites of the type that may be described as jumps from the condition "not likely to happen" to "did happen" occur. These are events that, though sometimes conceivable, are not foretastable. They are what we customarily term random events, being of low probability they are neither predicted nor planned. But they may be mutative events re-orienting the entire direction of history. Whether the events we term random are indeed chance events, or only appear to be chance events because of our extensive ignorance of the processes of change, is a deeper question for which we have no satisfactory answer at present. The immediate problem concerning random events is how to allow for them in our thinking about the future.

A CYBERNETIC MODEL

In our times, we customarily endeavor to forecast the future by means of trend extrapolations. In doing this, we assume a model of change that operates, at least in part, deterministically. On the other hand, when we set goals and make plans we assume a model that is undetermined and responsive to our purposes and volitions. Thus, the practices of extrapolating trends and formulating plans require a model of change that is in part deterministic and in part normative. How may we formulate a model that will be

capable of consistently subsuming both of these processes (ontological vis eleological, historically held to be contradictive) and provide in addition a place for random events?

The experience of recent years in designing sophisticated control systems such as those used in aerospace, petrochemicals, and communication, together with the rapid developments in computer science, has resulted in techniques for modeling complex systems containing large numbers of interacting subsystems. The basic concepts of the structure and behavior of these "cybernetic" systems supply a framework that allows a self-consistent model of change resolving the traditional contradictions of the deterministic and the normative. This may be seen in a general way by taking the trend extrapolations and forecasts concerning the most probable future to correspond to existing states in a control system; and taking the goals and plans to correspond to the desired state of the system. The difference between the most probable future and the desired future corresponds to the error signal. The determinative corresponds to the inertia of the existing state while implementation of a normative input corresponds to the correcting signal. Random events affect the control system in the same way as they affect social systems, so a cybernetic model (at least to first order) can serve for our model of change.

The three general problem areas that correspond to the basic components of a cybernetic model are accordingly:

- The extrapolation of the recent course of events to ascertain a sequence of most probable future states and dates as would develop if unmodified by additional normative and random inputs.
- The evaluation of these most probable futures in terms of society's capabilities, needs, and preferences in order to specify desired future states and dates.
- The design of organizations, plans, and strategies to implement the desired states.

Let us next look in more detail at the content of each of these basic problem areas and their sub-problems.

Predictions Implicit in the Determinative

The determinative acts as a "push" from the past. Its vector direction is defined by what has gone before. Its most probable path is implicit in what already exists just as the essential nature of the oak is implicit in the acorn. The vector length (the duration in time of the determinative element) has a most probable magnitude that is also implicit in what already exists.

Since the cybernetic model allows the modification of existing configurations, we shall use the expression *quasi-determinative* for those existing vectors whose directions and durations may be altered by normative or random inputs, and use the expression *ortho-determinative* for those components that, being built into the hardware, are unalterable.

There are three classes of quasi-determinative factors: first, those factors that play a determinative role because of restrictions placed by technological feasibility. The total potential hydro-electric power of a nation affords an example. Given the present level of technology this is a bounded and non-modifiable quantity. However, as new technology pushes back the frontier of feasibility, say through the development of weather control capabilities that could be used to cause more intensive rainfall in selected areas, the potential hydro-electric power could be increased. The question of whether to increase the potential and actual hydro-electric power then becomes a normative one. A second type of quasi-determinative factor arises because of our ignorance of alternatives (or even because of our ignorance of the existence of a parameter). Columbus's proposal to reach the East by sailing west violated the quasi-determinism governing feasible routes to China set by the concept of a flat earth. Without any advance in technology, a "noetic" innovation greatly increased the normative space available for the planning of routes to the East.

The third type of quasi-determinative factor is that implicit in our value system, the determinative constraints being imposed by our codes rather than our technology or ability to conceive of alternatives. In the Middle Ages, usury was forbidden by the principal ecclesiastical codes of the West. With the erosion of this proscription came the development of wide-spread credit, one of the most important normative factors in present economic structures. But not all quasi-determinative factors are undesirable. Some we choose to retain. For example, there are no conceptual or technological factors enforcing the quasi-determinative structure of a four-year tenure of leadership on the United States Government. This is a factor which because of our value of stability we intentionally retain as determinative rather than make normative.

While the limits of technological feasibility and noetic imagination are clearly determinative, the third limit of axiological proscription is violatable. For this reason the distinction between quasi-determinative factors of the third type and purely normative factors may appear somewhat

superficial. It is essential, however, to be aware of the portions of our choice-of-action space that we bound by value constraints and the portions that we leave unrestrained.

What properly constitutes an ortho-determinative factor, or whether there even exist strictly ortho-determinative factors, are questions belonging to the morphology of models of change. For the purposes of the cybernetic model, we may take as ortho-determinative factors those constraints such as physical laws that, to the extent of our present knowledge, may not now or in the future be modified by human volition.

There are three important sub-problems of the determinative problem area. The first is the design of suitable methodologies for extrapolating past events to give probable future states with their most probable time tables. The Delphi method is an example of a useful technique for this purpose, one that has been especially valuable for making technological forecasts. (*Social Technology* by Olaf Helmer, New York:Basic Books, 1966.) The second important sub-problem is finding keys that aid in establishing the relative significance of observed trends and lead to identifying those parameters which serve as the best indicators of future states. The third sub-problem is the problem of determining the most probable aggregate effect of all the individual trends. The cross-impact matrix analysis is a useful technique that has been developed for this purpose. ("Initial Experiments with the Cross Impact Matrix Method of Forecasting" by T. J. Gordon and H. Hayward, *Futures* 1:100-116, 1968.)

Assessment and Definition of the Normative

Just as the determinative acts as a push from the past, the normative or goal-directed acts as a pull toward the future. The directions of the normative vectors are defined by the specific goals sought; the lengths of the vectors are set by the target dates for implementation. Whereas the determinative vector space functions more or less like those used to describe purely physical systems (gas dynamics or plasmas), the normative vector space represents a set of conflicting individual and collective wills and defies homologization to a physical system. The introduction of freedom and volition into a system is more than merely the introduction of a large number of degrees of freedom. Volition cannot be simulated by conventional concepts of force. Aggregate volitional processes are more complex and outcomes are less predictable.

The principal sub-problems of the normative area are:

- The generation of the full option space. The technique of morphological analysis is one of the most useful available for generation and recognition of all the possibilities available to choice. The morphological approach customarily generates the option space to the noetic limits, then introduces the various ortho- and quasi- determinative factors to reduce the space to the normative option space.

- The setting of goals. The decision as to which options within the normative option space are to be selected for implementation involves several aspects. There are the questions of who makes the decisions and by what process. What basic value system is to provide the yardsticks for benefits, costs, and risks? What priority algorithms are to be used? What are the dependencies of choice on time? and so on. The setting of goals is customarily done by one of two approaches, frequently called the "top-down" and the "bottom-up" approaches. The top-down approach begins with a value input using, for example, a societal need or preference as the point of departure. The bottom-up approach derives its goals from the opportunities made available by change. Opting in the top-down case is tree-structured from a primary goal; while opting in the bottom-up case is usually based on the importance of following new leads that may ultimately increase the option space. Whereas the bottom-up approach is generally justifiable in the case of basic research, its use in applied research and development is open to question.

- The assessment of normative feedback. In addition to the setting of goals or the advanced assessment of options is the problem of the subjective assessment of the feedbacks from earlier normative inputs. Here the Delphi method is again useful in determining "indices of satisfaction" covering various developments.

- The aggregate effect of sub-goals. The problem of the aggregate effect of the cross-impact of large numbers of sub-goals and the cross-impact of these normatives with the determinatives again calls for the use of a methodology such as that of cross-impact matrices.

- The identification and measure of social pressure. There are societal processes of a determinative nature arising from aggregate volitions (similar to the dialectical processes of Marxism). Normative pressures and counter-pressures tend to grow from germinal dissatisfactions within societies. A problem of the normative area is to find indicators and measures of intensity of these pressures.

Implementation of the Normative

The ingredients of implementation are will, decision, knowledge, resources, and organization. Will and decision not only set the goals aided

by axiological inputs as outlined above, but operate to formulate plans and strategies, secure resources and create organizational tools required for goal achievement. The implementation processes involve a complex multi-level structure with feedback loops between goal and plan, plan and resources, organization and plan, and so on. Ofttimes, as in the case of the "Man, Moon, Decade" goal implemented by NASA in the 1960's, each level in the structure evolves rapidly with time.

Many of the sub-problems of implementation, because of their immediacy and specificity, have been widely studied. Techniques for solving these problems appear in the literature under classifications such as management science, systems management, or operations research. However, important considerations such as "How long does a given goal, plan, or organization remain meaningful in a rapidly evolving context?" and "When cross-impacted with the complex of other current plans, does a given plan still lead toward its desired goal?" have been neglected, resulting ofttimes in continuing efforts in directions that are counter-desirable.

ON SOCIAL INDICATORS

The understanding and predicting of the behavior of complex systems, be they physical, biological, economic, or whatever, depend on the development of a theoretical model of the system in which the relations between various observable parameters may be mathematically simulated. In the absence of a formal theory sometimes forecasts of future states of a system can be derived from the temporal patterns of certain observables of the system (e.g., weather forecasts). In either case, the prerequisite to prediction is the identification of a set of measurable parameters to whose changes the system appears to be most sensitive.

In treating the nation and society as a system it is quite in order to call for a set of social indicators to serve as the base on which to construct either a statistical or formal model. However, since the choice of the proper indicators can be made only as knowledge of functional or statistical relations between indicators can be established, selection of indicators must be made by successive approximation. The complexity of social systems has precluded the emergence of the sort of sharp functional

relations between parameters that are observed in simpler systems (such as the relation between temperature, volume, and pressure of a gas). There is therefore considerable uncertainty not only in where to begin with the matter of formulating a good set of social indicators, but also in whether a social system can be usefully described for purposes of evaluation and prediction in terms of a limited set of measurables.

Several social indicators have been proposed and are currently in use. For example, President Eisenhower, in his third State of the Union address in 1955, in addition to his report on the nation's economy, discussed the states of health, housing, race relations, and pollution. He also spoke in general terms about freedom, justice, and peace. John Kennedy added problems of cities, crime, education, and transportation. The following subjects are cited by the recent Health, Education and Welfare Panel on Social Indicators as basic social indicators:

- Opportunity and social mobility
- Health
- Public order and safety
- Learning, science, and art
- Participation and alienation
- Physical environment.

In some of these areas measurable ingredients of the aggregate indicator are readily evident, e.g., life expectancy, days of bed disability for Health, incidence and type of crime for Public Order, etc. But meaningful measures of the condition of the arts or the degree of alienation are not so evident. While the above indicators undoubtedly have something to do with the social well-being and future prospects of the nation, it is not at all clear that they are the most meaningful or sensitive indicators by which to structure the components of change or to compare the nation's existing condition with an expected future condition. We need indicators of qualitative change as well as of quantitative change, measures of innovation as well as of growth. We need indicators of individual change and satisfaction and indicators of aggregate change and satisfaction. Procedures for evolving useful sets of all these types of social indicators will be a continuing task in preparing the Future State of the Union yearbooks.

Accepting that better indicators will be recognized through successive selections involving feedback evaluations, we properly begin with the indicators already proposed. However, these indicators might profitably be supplemented by experiments with two additional approaches: first, indicators derived from societal decompositions; and second, "soft" indicators such as satisfaction indices.

The Decomposition Approach to Social Indicators

Social indicators as conceived in much of the recent discussion on the need for social accounting (e.g., the HEW publication, *Toward a Social Report*, Washington, D.C.:G.P.O., 1969; or *Social Indicators*, ed. Raymond A. Bauer, Cambridge, Mass.:The MIT Press, 1966) generally refer to the condition of individuals. For example, the basic categories of the HEW report are Health and Illness, Social Mobility, Income and Poverty, Crime, Learning, Science and Art, Participation and Alienation. The inherent reference to individuals is predicated on the assumption that the optimum state of society is isomorphic to certain optimum states of being or becoming for individuals. That is, this approach to social indicators requires measuring conditions of individuals in society and, in turn, statistically treating these measurements in the aggregate following the pattern of "aggregative measures" utilized in the National Income statistics. While the condition of the individual is certainly an important ingredient in the condition of the society, it is an insufficient measure of the whole. This is because in any aggregate (such as a human society) in which the whole is greater than the sum of the parts, statistics based on the state of the elemental parts frequently fail to show the state of the relations between the parts. Before continuing to discuss indicators to measure the "social health of the Nation", it is important to know what constitutes a social entity. Until we have some clear notion of what distinguishes a society from an aggregate of individuals, it is difficult to identify indicators that measure the state of its health. It may not be a valid assumption that a healthy society is a set of healthy individuals. The identification and utilization of meaningful social indicators depends on whether society can be modeled as an organic whole or only as a statistical aggregation of individual behaviors.

The problem of formulating social indicators belongs to the class of problems called "parts and wholes" treated under the theory of levels (see for example, *Hierarchical Structures*, eds. Whyte, Wilson and Wilson, New York: American Elsevier, 1969). It is intrinsically bound up in the problem of specifying boundaries between sub-groups and isolating interfaces across which information and/or mass-energy exchange can be observed. It is for this reason that one point of departure in the task of parameterizing a social entity is that of decomposition of the society to locate various interfaces among sub-entities of the society.

The purpose of a decomposition is to identify interfaces between subsystems that may be useful in making visible salient parameters or indicators. The useful interfaces are those across which flows (inputs and outputs) may be observed and measured. The most significant interfaces will be those providing maximum isolation, that is, those across which the interactions or flows drop to a minimum. The parameters providing the most economical and sensitive descriptions will in general be those causally related to these minimum traffic interfaces.

Before outlining proposed decompositions that will be useful in the search for social indicators, we may illustrate how indicators derive from minimum exchange interfaces with the current "generation-gap" phenomena. The gap reflects a decomposition of society by "cohort aggregates" well known to students of demography (see "Social Forecasting" by Otis Dudley Duncan, *The Public Interest*, No. 17, Fall 1969, pp 88-118). "A cohort is the aggregate of all persons who experience an event defining their membership at approximately the same time; the birth cohort of persons born in a given year or in a five-year period is the prototypical example." The generation gap satisfies the condition of minimum exchange across interfaces since its characteristic feature is the inability of the older members of society to communicate with the youth, and vice versa. If we ask what characterizes this interface we are led, among other parameters, to the much discussed ability of the youth to perceive hypocrisy in social modes and practices. Thus, one parameter that isolates the youth from the older generation is their perception of social hypocrisy. The increase in the perception of hypocrisy (measurable from a content analysis of rock-and-roll

music, humor, in-group jargon such as "plastics", television themes, radio disc-jockey commentary, etc.) indicates an existing or emerging social trend. Whether or not the incidence of hypocrisy is increasing or simply the detection of hypocrisy is increasing needs further exploration, but the level of hypocrisy (the ability to ignore in practice, codes claimed to be generally accepted) is an important indicator of the state of society, and the response to its being made visible cannot help but further affect societal evolution.

To implement the decomposition approach to social indicators, we suggest the following general decompositions: by institutional function such as manufacturing, agriculture, education, defense, service, etc. In this decomposition, the most important institutions and organizations would be identified and classified by their size, function, resource consumption, production, and waste. Size is measured by budget, number of employees, customers, and/or members. Function is defined by the social need met and by a set of characteristic times associated with the activity cycles such as production, new product introduction, and institutional obsolescence. Resource consumption and production are measured by the usual physical and economic measures, while waste will be measured in terms of pollutants generated and social, economic and ecological degeneration caused through direct and indirect operations. Other interesting decompositions would be by cohorts such as youth, the elderly, veterans, white suburbia, draft resistors, etc. and by special interest groups such as the peace movement, minorities, conservationists, national rifle association, civil rights, and so on. It is found that decompositions of society into sub-groups according to minimum exchange interfaces identify those groupings which impose life styles, value systems, standards of success and failure, and world views on their members. In today's milieu of global communication and travel, these groupings are no longer necessarily geographically contiguous. The purpose of alternative decomposition is to reveal parameters that recur in more than one decomposition. It is these parameters that are most likely to be the most significant and useful social indicators.

In addition to these suggested decompositions as a means of formulating social indicators, there exist methods for numerically analyzing large data

files that result from decomposition studies such as Honeywell's relevance-tree techniques and the cross-impact matrix technique. Although matrix characterization is a powerful tool in that it allows for quantitative specification and is amenable to high-speed computer programs, the central feature in the validity of any decomposition is its ability to represent the whole social structure. Matrix operations will not salvage erroneous or misleading decompositions. It is important, therefore, to provide a sufficiently large number of alternative decompositions and clusterings for analyses by these numerical tools in order to find meaningful descriptors of the social structure.

Soft Indicators

Indicators may be considered to be of two types, hard or soft. We shall call hard those indicators derived from measurables such as birth rate, level of literacy, number of strikes, infant mortality, and so on. Their utilization is a quantitative description of the present situation in terms of human and natural resources. The second type of indicators, which we shall call soft, are the subjective feelings of satisfaction or dissatisfaction of people. These are not readily quantifiable beyond rough scales of low or high. These "indices of satisfaction" may refer to feelings about events that have already happened (such as the landing of men on the moon) or to feelings about what will probably happen (such as the deployment of supersonic transport planes).

We can readily see that soft indicators provide a very direct way to evaluate the condition of a social system. Ultimately every evaluation is a matter of feeling, a subjective assessment of satisfaction or dissatisfaction. Since feelings cannot be accurately mapped on arithmetic scales, and since arithmetic values of measured parameters do not stimulate our feelings in nearly so sensitive a way as the events and issues themselves, there seems to be little gained in attempting to measure and translate a social system into a special set of numerical indicators, then run these numbers through a computer to give another set of numbers and finally ask people how they feel about these reduced numbers. For purposes of evaluating our satisfaction

or dissatisfaction with a social system--and this is our primary purpose in modeling our social system--we should be able to short-cut the quantitative simulation modeling used for typical physical and economic systems and go directly from the event, the situation, or the trend to our feelings concerning them.

The key to the selection of the most meaningful soft social indicators lies in the set of situations, trends, etc. that evoke our most intense feeling responses--the matters about which we feel concern. It will undoubtedly develop that many of the matters for which we feel the greatest concern are also readily measurable and their changes analyzable by conventional techniques. We may, accordingly, expect that the "feeling" approach to indicators will not remain "seat-of-the-pants" evaluating. It is also a point of departure for meaningful measurable social indicators.

A central feature of the Future State of the Union yearbook series could be to employ soft in addition to hard social indicators. Through the use of the Delphi technique it would be possible to ascertain indices of preference and satisfaction with regard to both prospective and realized technological, ecological and societal developments.

ON VALUES, PREFERENCES, AND GOALS

The nature of values and value systems and their role in the formulation of goals are fundamental ingredients in the design of normative procedures. In this section we review some attributes of values and goals and the problems they pose for the institutionalization of change.

Value may be considered to have its origin in man's need to supply relations between parameters that are found to be unrelated through either deterministic or stochastic laws. Variables that are neither functionally nor statistically dependent are thus ofttimes made axiologically dependent, that is, if no conditions of necessity or probability link them, they may be connected by "shoulds" or "should nots". Further, the absence of conditions of necessity is the condition of freedom. Hence, values and freedom arise from the same roots, with values implying freedom and freedom requiring values.

With value systems basic to normative processes, how do value systems affect social evolution? Our behavior and our attitudes are frequently shaped by our deeper-level value systems. For example, we observe the proclivity of the American public to litter the countryside with beer cans and trash. We impose legislative sanctions in the form of fines and penalties to change this behavior, but knowledge of psychological determinants of "littering behavior" shows that it is the attitude behind the act of littering that must be changed if the behavior is to be changed, and legislation alone is inadequate. Further, we can trace attitudes to an even deeper level that we may call "core belief". Core beliefs include our deepest value systems and although they are always active in shaping attitudes and behavior, they are not necessarily conscious. As an example, a historian recently pointed out that the exploitive attitude of Western man toward nature is traceable to the Judaic-Christian creation myth in which man is given dominance over the earth and sanction to use it as he sees fit. ("The Historical Roots of our Ecological Crisis", Lynn White, *Science* 155:1203-1207, 10 March 1967.) In developing this theme, White shows that "Christianity in absolute contrast to ancient paganism and Asian religions not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends." He concludes,"... we shall continue to have a worsening ecologic crisis until we reject the Christian axiom that nature has no reason for existence save to serve man." Thus, an examination of core beliefs and value systems is a prerequisite to understanding certain patterns of behavior. It should be noted that since many of the contributing deeper-level core beliefs are not conscious, by making them visible, both psychological reaction and denial may be expected, making the task of setting normative goals more complex.

For purposes of social change, a value system is characterized by its depth and durability and its rate of modifiability in response to contextual changes such as technological innovations. It is important to locate watersheds over which society passes that alter basic desiderata (e.g., the Biblical value to "be fruitful and multiply" after passing a population density watershed leads to the opposite value of population limitation).

The re-examining of basic values has been thought to be an area long "off limits" except to theologians. It has now become an essential foundation area in studying and realizing those futures compatible with the health of society.

Preferences derive primarily from human longings and appetites and, though associated with basic needs and values, may be independent of both. We may consider the preferable, the necessary, and the allowable, respectively, as corresponding to what we want, what we need, and what we value. In the exercise of the normative, preferences act as filters by which we narrow the range of alternative ways in which we satisfy our needs while staying within our prescribed values. In general, preferences lean toward maintaining the status quo and are not easily modified because satisfaction, where once found, returns to the same ground.

Goals, plans, and other normative mode ingredients may be classified by their scope and purview, the time for their execution and fulfillment, their degree of detail and specificity, and their cybernetic level with respect to other goals and plans. In general for plans and goals, there are trade-offs between comprehensiveness and specificity, extensiveness and intensiveness, field of view and resolving power. There are also trade-offs between frequency of renewal and specificity. Furthermore, levels of plans and goals also may be defined as in a control hierarchy with general plans or goals defining the form of all subsidiary plans and goals--as the Constitution of the United States delimits all lesser codes or as a building code delimits all specific house plans. We thus find that for goals and plans there are definite (almost functional) interrelations between cybernetic level, comprehensiveness, time of viability, frequency of modification, and degree of specificity. Some of the questions arising in practice are how to test the consistency of the short- and long-range goals (e.g., the constitutionality of specific laws) and to find the effect of feedback on the form and content of plans resulting from their partial execution.

There is one approach to goal setting, characteristic of sub-groups within a competitive society, that may ultimately prove limiting. Individuals and sub-groups tend to adopt as an indicator of "how we're doing" a measure of their input and output in some form such as salary, net profit,

units produced, attendance, circulation, and so on. It is then usually assumed that the optimum value for the indicator is some "as-large-as-possible" value, and maximization of the indicator is adopted as the primary goal. Individuals, corporations and other organizations then tend to evaluate their status and progress by the portion of the whole that they possess or have use of; that is, by their relative position in the competitive hierarchy. Thus, each sub-component of society tends to define its values and goals, not in terms of quality, inner satisfactions or fulfillments but with respect to position relative to other like components within the competitive context, irrespective of the state or direction of movement of that context. Two limiting consequences of this practice are the relative de-coupling of sub-group values from considerations of the status of the aggregate and the tendency to set goals for the aggregate through emulation of the competitive expansion syndrome of the sub-groups.

This approach to self-evaluation through measurements with respect to the state of the competition within a prescribed context is an emphasis on relativism that is highly correlated with extroversion in individuals. In this sense, it is not surprising that a culture which highly values extroversion (in contrast to introverted cultures such as India) should adopt this method of self-evaluation. However, the time comes when each individual or organization or nation must look inward and approach its self-evaluation in terms of its own inner structure, measuring its performance against its own potential performance. Competitive situations may supply surrogate goals for performance evaluation over indefinite periods, but in the long run performance must be measured against the function defined by the internal organic structure. A man may measure his performance and achievement against his buddies in nightly drinking bouts, but eventually his performance will have to reckon with his own intrinsic physical and psychological structure. Inner-directed evaluations require specified goals, bench-marks that are independent of position with respect to the competition.

In recent years, the appointment of various commissions to define national goals and the search for social indicators marks either the development of some measure of national maturity or a recognition that the national kidneys cannot take much more "Old Competitor" booze. Independent of the direction in which we are moving, our relative position with respect to the

competition (or with respect to the past) provides the surrogate "goals" against which most of our present evaluations are made. The selection of intrinsic or "ortho"-goals cannot easily be made without a deeper understanding of the nature of man and his relation to the universe. Until some of the philosophical questions have received more thought and better answers, we cannot expect individuals or groups to operate according to inner-directed goals or to abandon the sense of meaning afforded by the coordinates of competition. We may thus anticipate a continuation of indicators of competitive position such as the number of Viet Cong killed last week vis-à-vis the number of Americans killed, although this type of indicator has little relevance to the status of the military situation and no relevance as a measure of national self-interest or welfare.

There remains the important question of whose goals? Assuming that some form of machinery is provided that enables all individuals to participate in the formulation of the norms and goals toward which we shall direct the forces of change under our control, there remain groups and individuals who are very much concerned but are voiceless. Who is to speak for mankind? Who is to speak for the unborn? Who is to speak for the non-human portions of the living complex that forms the context on which our own lives and future depend? Unless all of these are given voice, those who control the forces of change will inevitably lose their own voice.

PART II. CANDIDATE FEATURES OF FUTURE STATE OF THE UNION YEARBOOKS

We live in a culture that focuses on decisions and decision makers. Our status ladder's top rung is for the executive; our highest rewards are for those who make our choices. In emphasizing the opting, we too frequently ignore the options. We relegate to a subsidiary role the generating of the alternatives among which the choice must lie and the testing of whether the candidate options adequately exhaust the possibilities open to us or do justice to our creative powers. In emphasizing the optors, we also too frequently ignore the criteria by which the choices are made. We tend to leave unexamined the unprogrammed pressures that intrude into the decision making process. The spotlighting of the most dramatic part of the action -- the decision itself -- serves to render less visible the rest of the action; the decisions already implicit in the array of options placed before the decision maker, the decisions already existing in the decision making process, and in the yardsticks or pressures by which the choice is made.

In order to bring into perspective these overlooked but vital components of choice governing our movement into the future, we must bring before our citizenry the germinal ideas, the research programs, the unfolding trends, the prospective opportunities, the incipient threats, possibilities, probabilities, forecasts--all of the ingredients that go together to generate our options. We must view these ingredients and their implications not when the newspapers tell us that they have arrived as options on the decision makers' desks, but as long beforehand as is possible in order that they may be understood, discussed, assessed, and given appropriate support or opposition according to our preferences. Participation in the generation and assessment of options is the citizen's responsibility in a democracy. Citizen participation cannot be secured only through expression of choice after options are printed on a ballot. By then, the future has to a large degree already been shaped. In an age of rapid change a way must be found for the citizen to participate in the generation and selection of the options.

The Future State of the Union yearbooks constitute an experiment in finding ways in which this may be accomplished. The proposed yearbooks should have features which will lead to the development of methods by which

every citizen can generate his own scenarios of the future and assess candidate options. But the yearbooks must do more than facilitate the citizen's recognition of the possibility of choice. It is important that the yearbooks make visible the factors that impede the free exercise of choice. But even more importantly, to have choice without also having criteria for assessing or methods of opting is futile. Therefore experiments in evolving criteria by which we can assess and make choices must also be a feature of the yearbooks.

In accordance with these guidelines, the following subjects are proposed as candidate departments for the initial yearbook:

- Technological and Environmental Forecasts: anticipated developments and opportunities stemming from new scientific and technological advances.
- Highly Predictable Societal Developments: anticipated societal changes and reactions to technological and social innovations.
- Survey of Critical Situations and Needs: anticipated shortages, imbalances, and excesses in resources, society and the ecology.
- Societal Options and Scenarios of Possible Futures: anticipated consequences of low-likelihood dislocative events, choices and opportunities requiring evaluation and decision.
- Miscellaneous Features: overviews of major current plans and projects, resource inventories, statistics of key social indicators, etc.

The more detailed descriptions of these proposed departments follow in the next sections. In order for the yearbooks to be more than glorified newsletters, the selection of indicators and specific items to be compiled under the above categories must be organized so as to make visible progress toward avowed goals. That is, implicit in the concept of "State of the Union" are the idea of movement, an assumed set of desiderata, and a set of meaningful parameters that make visible motion relative to these desiderata or goals. To identify the salient indicators and how they can best be used to display significant social trends will require the experience of several years with feedback from earlier yearbooks. The organization need not be sophisticated at the outset, but its refinement is a continuing effort for subsequent volumes.

TECHNOLOGICAL AND ENVIRONMENTAL FORECASTS

The prime mover of most change in today's rapidly changing world is technological innovation. The accumulation of scientific knowledge and its application through technology have changed our standard of living, our style of life, our values, our mores, and even our basic view of the world and ourselves. And now it is becoming increasingly evident that technological processes through pollution and combustion are changing our eco-environment and, quite possibly, the climatic environment. If social change and environmental change are derivatives of technological change, then the most critical area of forecasting is technological forecasting. This not only because of science and technology's effect on the social and physical environment but because the level of technology defines the frontier of what is feasible for man to do, and in extending the limits of the possible the level of technology plays a central role in defining the area in which man's realizable goals must lie and within which normative decisions must be made.

With this much importance attached to the growth of scientific knowledge and to development of technology, we logically inquire what controls the manner and direction of this growth, how may possible future innovations be predicted and how are the preferable future innovations to be selected. Scientific knowledge grows organically. The researcher not only pursues those interesting leads that contain promise of a solution to his problem but also other interesting leads that may have nothing to do with his primary research problem. The direction of growth of knowledge is thus only partly controlled by research problem selection, and the exercise of the normative consequently does not effectively enter into the basic research stage. It is in the applied and developmental stages that normative go or no-go decisions are made. Thus, while the initial assessment of whether or not to pursue a lead may be made solely by the researcher, the responsibility for success or failure resting on his judgment; the subsequent assessments of whether to exploit the possibilities revealed by the basic research through its application and development properly involve the consideration of all the societal and ecological consequences of implementation. It is for this reason that what is indicated as a possibility by current and anticipated

research results should be assessed, before development, in terms of societal and ecological benefits and risks. An important function of the Future State of the Union yearbooks is to provide both forecasts of highly probable research results and, if developed, pre-assessments of their likely societal and ecological consequences.

Experience with the Delphi technique as a methodology of technological forecasting indicates strong convergence among the panelists on the developments that are most likely in the near future. The most uncertain components are the dates at which predicted developments will take place. There is also promising experience with the Delphi technique in technological assessments. Thus, for the Future State of the Union yearbooks, Delphi provides a useful initial methodology for technological forecasting and for advanced and after-the-fact assessments of prospective and accomplished technological developments. Possible procedural steps for Delphi forecasting and assessing technological change could be set up along the following lines:

- Survey of new and anticipated basic research results in various fields of science through interrogating key scientists and compiling lists of what research is being funded and conducted by universities, industry and government, with review of major Requests for Proposals.
- Evaluations of the importance and probable dates of realization of results, using Delphi scientific panel.
- Evaluations of social and environmental consequences of implementing probable future research results, using scientific and other Delphi panels.
- Publication in the yearbooks of the Delphi analyses of prospective research break-throughs, their probable dates of occurrence, and the societal and ecological assessments. Readers of the yearbooks who desired could then enroll as normative panelists to opt on the desirability of implementation of specific anticipated discoveries.

Until the present, the normative response to new technological possibilities has been to opt for the limit of feasibility. We have rather consistently done everything that our increasing technological capabilities permitted us to do regardless of the societal or ecological consequences. The idea of assessment in advance and possibly opting not to implement all new scient-

ific discoveries is only now taking hold. The proposed Delphi steps would inaugurate an experiment in evolving an alternative approach. A set of technological possibilities together with their social and ecological assessments could appear each year. The assessments of the normative panelists on the advisability of the implementation of the set could be published in the following yearbook.

HIGHLY PREDICTIVE SOCIETAL DEVELOPMENTS

The impetus of a two-century thrust of accelerated technological development has won for technology an almost uncontested role as the initiator of change. While great societal changes of the past (e.g., the Reformation and the French Revolution) were inspired by innovative religious and social thought, today's societal changes are almost exclusively responses to situations created by technological innovation. One result of societal evolution through adaptation to technological change is the near abandonment of socially innovated goals. Instead, the social normative is forced to find its primary expression through seeking to guide technological innovation in paths compatible with human weal and need. And to date, the social normative has had only a minor voice in shaping the course of technological development. This situation has two consequences. First, the process of evolution through adaptation to a rapidly changing technological environment defocuses innovative social thinking on basic philosophical considerations concerning the nature of man and the good life and refocuses on social holding actions to bind up the wounds created by some of technology's sharp edges. Second, the process of evolution via adaptation nurtures a growing normative pressure within the collective psyche that may surface with explosive force unless it can find expression in a genuine social normative initiative. As an example we may cite the increasing antipathy of youth to science and technology as an indicator of incipient normative pressure buildup.

The task of predicting highly probable societal developments contains two central components. The first is to project the likely social responses to the most probable technological futures in sight today. These most probable futures may be made available through the techniques described in the

section on technological forecasts. Since projecting social response involves a double prediction (both a technological forecast and the likely social response to it) the forecasts of future societal changes are subject to much greater uncertainties than technological forecasts alone. This double uncertainty which follows from the fact that forecasts, like probabilities, combine as products, not sums, emphasizes the already mentioned lack of a social normative initiative. It is conceivable that this one-sided dominance of technology to initiate change could be replaced with a growing ferment of innovative social thinking. For example, the appearance of such proposals as guaranteed annual income, semi-autonomous cultural communities such as hippie communes, pluralistic co-existing all-white, all-black and integrated economic communities introduces the requirement for forecasting and assessment exercises based on innovative sociological imagination. The Delphi methodological approach described for technological forecasting and assessment could be adapted with suitable panels for such social forecasting. However, until innovative social imagination catches up with technological innovation, the Delphi technique is a useful initial approach to the first of the two social forecasting tasks. A program based on the following could be used for forecasting highly predictable societal developments:

- Survey of the most probable social responses to the set of technological forecasts by joint sociology-technology panel.
- Survey of probable psychological responses to the socio-technological events using a socio-psychological panel.
- Synthesis of above responses with the assessments of normative panelists selected from the feedback from publication of the yearbooks.

The second societal forecast task is to reach the pulse that records the building-up of hidden normative pressures in order to anticipate what may later develop into intense overt reactions. Because this notion is central to the possibility of making accurate societal forecasts, it will be worthwhile to amplify how normative pressures build up within the collective psyche. From depth psychology we now know that a compensatory function operates between the conscious and unconscious realms of human nature. Pres-

sures build up when there exist imbalances in realizing all sides of our personal or collective nature. Because of the one-sided dominance of rational technological innovation, we can today see evidence for a counter-movement toward the irrational side of human nature in the widespread use of drugs, the withdrawal of youth from established social codes, the increase of interest in astrology, mysticism or Eastern religion, and the general disenchantment with science and technology. The germinal evidence of this anti-rational societal trend, however, was visible in art and literature since the turn of the century. Thus, it is to the contemporary art and literature that we turn in order to sense the pulse of present and future hidden pressures. The task of making visible what lies just under the surface of consciousness has always been the function of the artist, the poet, and the shaman of every age. These individuals and their creations are the precursors of consciousness. Had we looked, the trend toward withdrawal and experiments with drugs could have been detected in the writings of such authors as Jack Kerouac during the 1950s, for example, even though we might not have been able to predict the precise form it would take with the youth in the 1960s. Societal forecasters must find ways to incorporate interpretations of art critics such as Wylie Sypher, who points out that "just as the concepts of mass and force in modern science have given way to theories of field and ultimate particles, so, too, one finds in art and literature a corresponding trend toward the disintegration of the traditional representational objects and forms.... The dominant themes of modern art and literature, and especially the tendency toward non-identity, reflect the major intellectual developments of our times." (*Loss of Self in Modern Literature and Art*, New York: Vintage Books, 1962.)

The second task for social forecasting may be approached, therefore, through identifying the central themes that appear in the imagination of artists. It will not be sufficient, however, to query artists themselves to obtain these themes, because creative individuals work to give conscious form to the images they encounter in the unconscious. The interpretation of the results of contemporary art must be done by those who are primarily concerned with detecting contextual and temporal relations among the products

of creative endeavors in the same manner that the fruits of scientific research require interpretation and assessment by someone other than the scientist.

SURVEY OF CRITICAL SITUATIONS AND NEEDS

One of the most valuable products of technological and social forecasts is the anticipation of critical situations toward which present trends are leading. Advanced knowledge of shortages and surpluses can be used cybernetically to relieve excessive fluctuations. Advanced knowledge of a shortage of medically trained personnel or a surplus of physicists can guide students in the selection of courses of study. Proper forecasting of needs obviously provides opportunities, but most "need" situations are cybernetically more complex than just oiling the squeaky wheels. The response to an anticipated shortage of medically trained people, for example, may involve implementations on many levels requiring different accommodation times. It is not just a matter of enrolling more students in medical courses to assure an increased supply of doctors in four to six years. New medical colleges that cannot begin to receive students before four or six years may be required. And the correction of the shortage may require a new educational orientation such as multi-level training for different health care tasks. The acceptance and implementation of such new approaches may require even more years before the tide can be turned. Hence, in addition to forecasts per se, a most useful feature of the Future State of the Union yearbooks would be forecasts giving the restorative effects of remedial measures taken to counter undesirable trends--"PERT" charts describing corrective responses and their probable effects.

In general, by a critical problem is meant a situation that is tending to a "crisis point" or a point at which some irreversible development occurs that radically alters the subsequently available spectrum of choice. Examples are an arms race moving to the crisis point of outbreak of nuclear war, increased pollutional alteration of the atmosphere leading to the triggering of major climatic change, spread of the use of drugs so as to lead to social collapse. Measures of criticality are given by the size of the area or number of persons affected, the temporal duration of the physical, social, or psychological dislocations, the degree of ultimate irreparability, and the

rate of approach to the crisis point. Since critical situations, as defined, arise out of the activities both of society as a whole and various of its sub-components, it is important to identify the major activities contributing to the criticality and their distribution among sub-groups. It is also important to trace the contributing activities to more basic activities and attitudes, disclosing both direct and indirect factors. For example, it is not sufficient to look at the problem of atmospheric pollution only in terms of the automobile and industrial smog. The total role of combustion in human activity and in the natural environment must be analyzed. It is also useful to examine the "characteristic times" in the growth of crises such as the time from recognition of a critical situation to the beginning of implementation of corrective action. Many critical situations have to do with approaching a limit in some natural or man-made resource. The values of known limits, estimates of the remaining distance to these limits, and rates of change in the use are important inputs for identifying characteristic times of such critical problems.

In many developing critical situations no solutions exist, and research must be undertaken with no precisely predictable timetable for the availability of results. In other cases solutions are available but years of education are required before political processes can respond to the needs. The advanced warnings of crises together with information regarding the availability or non-availability of solutions is the first step in the educational effort.

Today there is public awareness of many critical problem areas: pollution, education, health care, transportation, and so on. The public directly experiences the effects of these problems. But the trends toward criticality in these areas have been known to specialists for years--valuable years in which corrective steps could have been initiated at relatively smaller costs. A way is needed to make forecasts of critical situations available to the public and to train ourselves to respond before the consequences and costs of undesirable trends overwhelm us. To respond in advance is a sine-qua-non factor for man's survival in the future. Reprogramming ourselves for "before-crises" responses is one of the most critical long-range corrective measures to be made.

SOCIETAL OPTIONS AND SCENARIOS OF POSSIBLE FUTURES

The exercise of the normative process is limited by the spectrum of available choice. The available options are those produced by our imaginations and technological capabilities filtered by physical and moral allowability. Through our selection of indicators we frequently further reduce our options, returning areas of the normative to the determinative. For example, in measuring our progress through focusing on past performance and comparing rates of change or growth of income, productions, and so on, alternative possibilities available to us tend to become lost. The directions into which we move become dominated by our performance analyses and "we drive into the future steering by the rear-view mirror". Another example of a practice leading to the abdication of normative freedoms is market analysis. Markets are primarily where the "action" is and has been. The projection of markets into the future is confining the search for opportunity to the direction set by the push of the past. Large capital investments in certain product areas contain a determinative inflexibility that forces the customer to the existing product area rather than initiating searches for the areas of need toward which to alter production. It is in the inertia of such unwieldy configurations that the production advantages of bigness begin to weigh less and the flexibility advantages in being more responsive to need of smaller operations begin to weigh more.

The participation of citizens in societal options can be developed in the Future State of the Union yearbooks through scenarios of social configurations compatible with anticipated technological developments. For example, a future consisting of a set of societies each of which exists primarily on the recycling of its own bank of resources can be sketched in several alternative forms to present options for a world that will soon have to resort increasingly to recycling. The reader can then exercise his own creativity by developing alternative recycling societies compatible to his own preferences and values.

Another important use of scenarios is their help in thinking about low-likelihood events with major dislocative consequences. This is the type of event described in the model of change as a random event. What if the

President were assassinated?--a "random event" that Americans have encountered four times in their history. What if there is a major earthquake in California? What if an ICBM is accidentally fired? What if there is a nationwide power failure? And so on. Events of this sort can happen and, having happened in some form or other in the past, they enter into our thinking about the future in the form of contingency planning. In fact, we usually prepare contingency plans for foreseeable events whose dislocative effects are large enough though their probability of occurrence is small. But members of the class of foreseeables that we take seriously enough to counter with contingency plans are usually defined as having probabilities of occurrence sufficiently large so that they have already occurred at least once.

But there are other "what-ifs"; what-ifs that have not occurred before but if they did there is little question as to their major perturbative consequences. Large radio telescopes pick up signals that can only be attributed to transmission by another intelligence in the universe. A new death-dealing virus created in the laboratory accidentally gets out of control. LSD is dumped into the reservoirs of thirty major cities in the world. These are what-ifs conjured up in the imagination of science fiction writers, but their consequences and/or implications would be major. Except for having recognized their possibility--being forewarned is being forearmed--we have no plans for coping with them. The problem posed by this class of what-ifs is again how to treat them in our thinking about the future. Their probabilities may not be sufficient to justify the preparation of contingency plans. But their probabilities are sufficient to justify "contingency fantasies", that is, thinking through the possibilities, the implications, and synthesizing alternative responses without going to the formality of planning, creating organizations, or assigning responsibilities.

A third class of "what-ifs" are those random events whose explicit content cannot be specified but whose form can be imagined: a scientific discovery of revolutionary consequences, an unexpected watershed in our social and physical evolution, a totally unexpected dead-end to present practices; or a breakdown in our present systems.

The first class of "what-ifs", those that have happened before and for which we make contingency plans, constitutes tests of our practices and in-

stitutions. The second class of "what-ifs", those that have not happened before but which we can imagine in their specific content, constitutes tests of our motivations and Weltanschauungs. The third class constitutes tests of our ability to imagine. In thinking about the future, it is the responsibility of the forerunners of awareness to extend the realm of the imaginable and in so doing to become an early-warning network for the collective social and technological imagination.

MISCELLANEOUS FEATURES

In addition to the four principal features of the yearbook, sections making available certain statistical information of importance to futures analysis might be included. Even though these data are published elsewhere, their collection in one place may prove useful, if for no other purpose than to spotlight current thinking concerning the most relevant data for futures research. These could include resource inventories and their projections, statistical trends in key indicators such as population, college enrollments, unemployment, etc.

It might also prove worthwhile to present descriptions of major proposals and plans being considered or implemented by governmental and other institutions with evaluations of their impacts on the future (for example, ABM, SST, steam car, etc.). Overviews and critiques of such items as proposed tax modifications, drug legislation, and other controversial issues that require advanced public discussion could be included. The yearbook would serve as a forum for the pros and cons of new proposals in this section.

Additional features, as suggested earlier, might include new concepts and emergent ideas in the arts and literature and their portents--new utopian schemes, curriculum experiments and trends in education. These features would evolve when feedback to the successive yearbooks indicates the most effective material for achieving the primary goal of institutionalization of change.

CONCLUSION

It is reasonable to expect that progress toward the institutionalization of change on a national or global scale will be slow--perhaps too slow to respond to the urgencies created by today's anarchistic mode of change. Nonetheless, a beginning must be made and the proposed Future State of the Union yearbooks suggest a good beginning, their main defect being that they did not begin two decades ago.

Several factors jointly contribute to the slow pace of bringing order to change: Foremost among these is that the need to structure change and subject it to public norms is not yet fully appreciated. Second, at present there does not exist a functioning science of change. The science of Futures is in an embryonic stage though progress in the development of techniques and principles is rapid. Third, there are powerful commercial interests whose short-term advantage is to continue unfettered their present practices of reductionist innovation. "Planning" is generally a dirty word and held to be a threat to freedom. Finally there is the immense inertia of centuries of custom and of the habit of thought that holds the future to be the business of the future.

It is on the level of these habits of thought that the greatest challenge to our future exists. There is little question but that effective techniques of forecasting, determining cross interactions of various technological developments, and ascertaining people's feelings about trends can be devised. But can the traditional attitudes that localize self-interest provincially in space and time, and the traditional behavior patterns that respond only to short-delay feedbacks be illuminated as having become dangerous to those who possess them and to the world as well? Herein lies the basic challenge of the future. This challenge itself reflects a crisis--perhaps the crisis that underlies most of the others.