SYSTEMS IN SOCIETY
Systems in Society

Edited by

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This volume contains many of the papers that were presented at the Fifteenth Annual Meeting of the Society for General Systems Research, in Boston in 1969. At this meeting major attention was beginning to be turned toward urban and environmental problems, which were to become thematic of succeeding meetings. The papers are arranged here in a manner that seems to represent the best continuity, even though they were involved in various sessions, including those on education and management.

The first paper, by Chen, defines and formalizes the process of problem-solving, differentiates between problem-solving and decision-making, and analyzes problem-solving systems. He points out that for a problem to exist there must be an actual state and a desired state and a difference between them, and problem-solving is the process used to reduce the deviation between the actual and desired states. For a problem-solving system, then these two states must be defined, and there must be an appropriate information system.

In the second paper, Banathy reviews the nature of the education system, in particular the educational information sub-systems. He breaks down the total set of educational information systems into the component systems and their interfaces, and discusses the complexity of the education process and need and methods for proper use of information.

The next paper by Tonnesen considers the nature of corporate planning and the part played by systems analyses. He reviews the contributions of model-building, simulation, game theory and theory of conflict. He divides decisions into strategic, administrative and operating, and is primarily interested in the problems of strategic decisions or long range planning. Four philosophies of planning are surveyed, pre-managerial, satisficing, optimizing and adaptive planning.

Taschdjian surveys ecological theory and the interactions between different parts of an ecosystem. A subsystem which maximizes its power output will not be operating at maximum efficiency; thus a climax system operates without much output useful to man. The ecosystem must be managed with man considered as a part of it with some optimum diversity, neither monoculture nor a climax system in full equilibrium. Information and entropy are considered, with the implication that a garden is preferred to a cornfield, because of the diversity of the former, with positive and negative feedbacks.
Richard Merritt reviews the process of decay in social systems. He discusses the difference between mechanistic and living systems, particularly the divisibility of the former and replaceability of parts. He goes on to the smaller social systems such as families and then to larger social organizations such as political parties and businesses. Production efficiency and innovation are important in a business organization, but may be in conflict in the research and development area. The decay of large scale political communities was studied by Edward Gibbon and others, but there has been no study of decay up to now across all levels of organization. Amongst other reasons for the disintegration of large organizations such as empires were excessive military commitments bringing more strains than gains, the pressures of additional social strata, ethnic groups or regions to be accommodated within an old system of political decision making, and unrealizable goals. It is also possible for changes in the system to arrest or reverse decay.

Firestone brings out the static nature of the Social Darwinist point of view of classical economics, and the hedonistic view of neo-classical economic man. In the former, man responds for his immediate profit, and in the latter, man responds for his immediate pleasure. Neither of them express the dynamic of feedback with the historical view of evolutionary economics, including the total socio-economic system, or human ecology, and the expectations at any particular time. The law represents a major device in both noting new economic arrangements in our society and helping to effectuate them, making change possible while composing the necessary ritual for acceptability in line with the prevailing customs. He concludes by pointing out the lack of any system of priorities in the allocation of resources in the United States over the years, and adds that the school of evolutionary economics is ready to contribute to the intellectual base underlying such an effort. Certainly as the environmental and social interconnections and interrelations become more strained with increasing population and standard of living, we will have to give more attention to the human ecology, and with careful analysis set priorities on the consumption of the various forms of material and energy.

Dechert discusses the logic of the systems approach to environmental planning, and considers the social universe as part of the ecological system. The term ecological system emphasizes viewing things in a context, like the logical category of Aristotle called "habitus", the thing in context.
The inputs and outputs across the various boundaries of the subsystems are called transactions. In many cases it may be desirable to reduce the number of transactions in society in a manner analogous to sympatric species, that is similar species occupying the same territory but with sufficiently differentiated ecological niche that competition is minimized. He suggests that society might benefit by encouragement of groups with independent cultures for the development of differing types of individuals, as compared to the present international tendency to homogenize manufacturing processes, products, cultures and personality types. He concludes that we should soon possess the capability of a knowledge-based society for the provision of an adequate physical basis of life for all and for the conscious intellectual, spiritual and moral development of autonomous persons.

Gordon Thompson urges consideration of the relation between communication and culture, for adequate communication planning, rather than reliance on the market or even on market research. Analysis for planning should be as free from cultural bias as possible and should also be process oriented rather than taxonomical. The three measures of communications effectivity which he emphasizes are:

1. The ease which stored human experience can be accessed.
2. The size of the common information space shared by the communicants.
3. The ease with which the society using the system can discover and develop a plurality of new and fresh consensus.

Speech, writing, the phonetic alphabet and printing and the telephone have been means of the first measure. Writing evolved with the city in Mesopotamia, and ushered in intensive material and intellectual development in China. Not only the amount of storage, but the traffic into and out of storage are important.

In addition to physical space there is activity space and information space, the second measure. As in the animal world a stag maintains his territorial space, the human can
maintain a "territory" by conversation. The telephone extends the common information space within which two persons can play their game, and it is unlikely that Picturephone will add. Major communications revolutions have tended to increase the size of the common information space.

The third measure represents the effect of group communication activity of a society in developing consensus. Popular songs and money are involved in consensus measures. The Greek amphitheatre represented the use of architectural technology for attaining consensus. The Egyptian withholding of the papyrus supply helped the demise of the Roman Empire.

Applying these measures, the use of a school-system film library was greatly improved. In another example, by proper use of graphic terminals in a time sharing computer system, the common visual space may be expanded. In the music industry, a song was a hit for months, when printed. Now with TV the pace is much faster and the publisher essentially is in the business of bookkeeping of performing rights.

The City of Wires must contribute on all measures as the city has done in the past. Communications accelerates the process of invention and the production of wealth. Computer time-sharing services will become commonly available without a heavy minimum charge. Technology from here on must revert to subservience to man, and our systems should evolve away from the present direction of subservience of man to technology, and our communications system should enable us to generate such a consensus.

Bertram Gross considers the city from a broad system point of view. First he considers definitions of the urban area, then the components of the urban crisis, recommending the term anthropolis rather than metropolis to emphasize the human with respect to the physical aspects of the problem. He points out that the city problem is a national problem, and that we should consider the metropolitan clusters, including the major megalopolises, the Northeast, Mid-west and Western. While there is much fragmentation in metropolitan government, yet there is a large variety of non-local government agency regional offices, and we must consider the interrelations of all these divisions. Head offices of major corporations in particular cities actually have major roles nation-wide, which means that many individual areas contain national and
international control centers. We are moving from advanced industrialism to a post-industrial science-based service society, and we need a new philosophy. Man's society has evolved rapidly from his prehistoric existence as hunter-gatherer. The Russian and Chinese revolutions were social as well as political. Gross believes that the American experience will be one of social without political revolution. He also believes that the "credibility gap" is an intelligence gap, in the poor collection and processing of societal information, and coins the phrase "ignorance explosion", to characterize the difficulties because of the former and the increased specialization in research and lack of generalized knowledge, and the fact that the more we know the more we find that we don't know. He discusses creative localism for future planning, to counter elitism. Localism should be less divisive now that we are a national society. We should with this as a basis for organization plan for 1976, and by 1976 be including political and human factors in our planning for the year 2000. The Mayors should be Metropolitan leaders, and area councils should help in planning. We need new models of the world, and they will have to be interdisciplinary in nature. Using general system principles, urban design should be metropolitan, three-dimensional and include social relations.

Thall considers the control of crime and violence in public housing particularly in Detroit. He found it necessary to try to understand the causes of crime in order to control it. In public housing, a large percentage of occupants are receiving public assistance and more and more are elderly. Actually only a small percentage of people receiving public assistance live in public housing, and practically no new developments were opened in Detroit since World War II. Of families with minors, many were broken, with female family heads.

In such families, children have little supervision, and their life style is often disorganized and highly permissive, and they have not been exposed to creative leisure-time activities, and peer group pressures make it difficult to conform to middle-class patterns. Upward mobility is restricted. A large percentage are non-white, but the majority of the elderly poor are white. Deterioration in quarters has proceeded because of increases in maintenance costs, partly due to vandalism. Poor, alienated and misfit people live in public housing because they have no other choice. There is no community spirit.
The criminal dangers include vandalism, burglary, theft, robbery, and assault, yet tenants tend to be apathetic about crime protection. Crime occurs not only within the confines of the buildings but in approaches and adjacent streets. Crime could be controlled by alarm systems, patrol, lighting, tenant education, tamper-proof devices, intrusion sensing devices, etc. It is desirable to have a measure of effectiveness of these procedures on deterrence and apprehension rate as well as on tenant fears and attitudes.

Preferably a solution should address the sociological causes of crime and violence in cities. Rapid social change has led to breakdown of traditional social roles, and to breakdown of the notion of rule by rule-making institutions. Without social action our cities will deteriorate. Improved shelter and social environment are necessary to prevent crime and violence; we must develop an ecological relationship, not merely an artificial substitution relationship to a mechanical environment.

Seder considers the various players in the medical care game. The players include the power elite, the humanitarians, practitioners, institutions, consumers, and third-party payment sources. He considers the factors of importance to the various players. By displaying the system in all its relationships, we are in a better position to recommend its path of development.

Lee has interviewed many young people and has developed a theoretical framework. He points out the importance of role assumption in the acquisition of identity, and describes the similarity of the process in the affluent as well as the deprived - for the affluent their needs were satisfied by their parents, and therefore the youth could not find meaningful roles, and for the deprived their parents could not give them the opportunity to find meaningful roles (abetted by the elimination of many unskilled jobs through the use of technology, while the media were making them so aware of their deprivation). Thus both affluence and poverty converged in producing identity-searching dissatisfied youths, through lack of roles.
Rashkis proposes the study of general systems research by youth either through the curriculum or through extra-curricular activities. Planning for the future by use of general systems is the rational substitute for violence and anarchy, and we should try to introduce the rational approach to the anti-establishment students. The student rebellion that seemed so prevalent at the time of writing of his article seems to have disappeared at the present time of writing of this Preface. Nevertheless the article is included as still representing a fundamental intellectual approach to the relating of student concerns to their educational process. While general systems as such may not have contributed directly to the recent change in student attitude, the systems approach has manifested itself in the concerns with ecology and the environment and the consciousness of the interrelatedness of everything. Perhaps we can contribute to a rational integration of philosophy of life with philosophy of science.

While there has been a delay of several years between the presentation of these papers and their publication, they are still timely and in fact in many cases edited and brought up to date. We are indeed grateful to the Vaughn Foundation and in particular to James M. Vaughn, Jr. for the financial support enabling us to assemble these papers for publication.

The Editor
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Under a variety of situations, individuals and organizations encounter and experience numerous problems of one kind or another. While the term "problem" has been used widely and repeatedly, its exact meaning has rarely been defined explicitly. Depending upon circumstances it often means different things to different people. Its meaning is largely a reflection of what one conceives to be a problem. To some a problem may mean something out of order, such as the breakdown of an automobile or a machine. To others it may be a task to be performed or a goal to reach, such as to solve a mathematics problem or a trip to the moon. Still others view problems as the existing state of affairs, such as the traffic problem, the pollution problem, or the drug problem, etc. In many cases, to solve a problem means to make a certain decision, be it about a job, a car, or a candidate. The purpose of this paper is to advance a conceptual and operational definition of what precisely is meant by a "problem", to analyze the components, structure, and the process of problem-solving systems, and to formulate a generalized problem-solving model.

What is a "Problem"

In this section, we shall inquire into the questions: What is meant by a "problem"? How many types of problems are there? What is the relationship between a problem and a decision?

What, then, is a "problem"? A "problem" may be defined as the deviation of the actual from the desired state of affairs at a given point of time. Symbolically, it can be expressed in terms of a simple mathematical equation:

\[ P_t = |D_t - A_t| \]

where

- \( P \) = Problem
- \( D \) = Desired State of affairs
- \( A \) = Actual state of affairs
- \( t \) = a point in time

Thus, by this definition, a problem can exist if and only if \( D_t \neq A_t \) or \( P_t > 0 \).
However, since $P$ is a function of $D_t$ and $A^t$, these two terms must also be clearly defined. What do we mean by $D_t$ or the "desired state" and $A^t$ or the "actual state"?

A "desired state" may be defined as a frame of reference which represents a goal or target such as objective, aspiration or destination etc. that is to be reached or achieved; or a yardstick such as a norm, criterion, standard, benchmark that is used as a standard of measurement. An "actual state" may be defined as the state of affairs as it exists at a given time. The former refers to "what or where to be", and the latter, "what or where actually is". These definitions are not intended as a semantic exercise but rather serve as the fundamental bases on which a particular problem is to be identified and defined. They are meant to be specific to render them operationally meaningful, and yet broad enough to encompass various types of problems.

Having defined the meaning of "problem" in the above terms, we can logically deduce that a problem exists only if any one of the following conditions prevails:

1) The actual state remains the same, but the desired state has changed. We shall label this a "Type I" problem.

2) The desired state remains the same, but the actual state has changed. This is a "Type II" problem.

3) Both the desired and the actual states have changed to different positions. This is a combination of Types I and II, or a "Type III" problem.

A few simple examples will illustrate the difference between these three types of problems. If an individual with a high school education (his actual state) wishes to pursue higher education and to earn a college degree (his desired state), his problem is to find ways to achieve this objective. This is a Type I problem. If, on the other hand, a firm which has maintained a 10% share of the market finds that it has been reduced to 8%, it is confronted with a Type II problem. When a country desires to land a man on the moon and needs a budget to carry out the mission (a change of the desired state), but finds that the budget is overrun due to inflation and resulting higher costs (a change of the actual state), it is faced with a situation characterized by a Type III problem.
It should be obvious that the reason we are able to classify problems into three simple categories is because of the fact that the term "problem" is defined in such a way that a deviation can occur only under these conditions. Such a definition and classification might puzzle some people. For example, some may wonder: what if the market share had increased to 12% instead of decreased to 8% as in the previous example, is it still regarded as a Type II problem? By definition the answer has to be yes. At a first glance this may not seem logical at all. But a further reflection should convince us that even an increase of the market share, if unexpected or not a part of the original desired state would mean an increased demand on the firm's resources and facilities which, in turn, would require the readjustments of such things as the forecast, budget, staff, capital, or inventory etc. Although this may not be regarded as an unhappy or undesirable problem, it is still a deviation which needs to be reconciled just the same. Of course, in some cases where a change in the actual state means an improvement of the situation, i.e. better than desired such as a sudden windfall. In this case, the solution to the problem is simply to readjust or raise the desired state.

In the meantime, others may wonder if such a classification is really necessary or useful. As we shall see later, there are conceptual and methodological reasons that problems be classified in this manner. First of all, the origins and sources of two types of problems are quite different. A Type I problem, being the product of a change of the desired state, is always a product of a decision or initiative imposed on the system. Thus, as in the previous example, the fact that the individual is faced with the problem of getting a college degree is because he has imposed the desired state on himself. It should be noted that a change of the desired state may be initiated within the system as well as by the environment outside of the system. For example, a motorist may have to change his desired driving speed regardless of how fast he wishes to drive, as the speed limit is imposed by law. On the other hand, a Type II problem which is a result of a change of the actual state is invariably caused by factors extraneous to, or by changes in the characteristics of the input of, a system. For example, illnesses (a change of the actual state from normal health) are known to have been caused by bacteria, viruses, (environmental factors), or malnutrition (change of input characteristics) etc.

Furthermore, when problems are viewed as systems and ranked in terms of hierarchies, the two types would fall into different categories. Inasmuch as Type I problems are a goal-changing,
creative process be it effected by the system itself or by the
environment, they belong to the systems of the highest order.
Type II problems, on the other hand, if merely performing goal
serving, corrective functions, play a somewhat passive role and
are, therefore, a lower order system. When a municipal govern-
ment initiates a fire prevention program, it is, in effect, cre-
ating a Type I problem. It is undertaking a positive measure to
avoid, reduce, or planning for a Type II problem which is fire
fighting and a negative action. Hence, the former implies cre-
ativity and leadership and the latter, the inertia and follower-
ship.

The two types of problems are also different in terms of the
methodologies and approaches applied thereto. A Type I problem
is primarily a system design problem with emphasis on system syn-
thesis, planning and prognosis. Thus once the objective (de-
sired state) is set, the task of the problem solver (or system
engineer) is to find ways and means (system design) of achieving
it. A Type II problem deals mainly with systems analysis with
primary concern on systems diagnosis and control. Approaches to
or solutions of many of the Type II problems can be and have
been routinized and automated but there is still no known way
yet that can replace the creative aspects of Type I problems.

So far as we have been concerned with the definition of the
term "problem" and its ramifications. A corollary term "de-
cision" has often been used synonymously and interchangeably with
"problem". It seems appropriate at this point to define the
term also in a precise manner and to examine the relationships
between the two. In a pure and simple term, we may define a " de-
cision" as the choice among alternatives. In general, a basic
decision situation may be depicted in the following matrix form:

\[
\begin{pmatrix}
    O_1 & \cdots & O_i & \cdots & O_n \\
\end{pmatrix}
\]

Strategies

\[
\begin{array}{c}
S_1 & P_{11} & \cdots & P_{ij} & \cdots & P_{in} \\
\vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\
S_i & P_{ii} & \cdots & P_{ii} & \cdots & P_{in} \\
\vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\
S_m & P_{mi} & \cdots & P_{mj} & \cdots & P_{mn}
\end{array}
\]
where: 
S's are strategies
O's are outcomes
P's are Payoffs
i = 1, 2, 3..., m
j = 1, 2, 3..., n

Thus, a decision is essentially a choice of strategies
given the state of the outcomes and their payoffs. Symboli-
cally it may be expressed in the following equation form:

\[ C_i = -(S_i \mid P_{ij}) \]  

Where \( C_1 \) = a choice (or decision)

The definition implies that a decision must be an act
or effect of making a choice or no decisions. Although the
definition suggests the payoffs as the basis for decisions,
their explicit values are not always known or available.
In reality, many decisions are made without such information
or with only partial information. However, some subjective
or intuitive judgement about the relative values of the pay-
offs, implicitly or explicitly, is always a necessary ingre-
dient for making a decision. It is not the purpose of this
paper to delve into the arts and science of decision making,
since an abundant amount of research and literature has dealt
with this subject in great depth. The body of knowledge de-
veloped in this area is commonly known as the "decision
theory" or the "game theory". Treatment of this subject will
be made here only in so far as it relates to problem-solving.

As referred to earlier, many regard a decision as a prob-
lem or apply the terms synonymously. But by our definitions,
they have different characteristics and serve different pur-
poses. While decision-making is primarily a choice behavior,
problem-solving constitutes a cognitive and search behavior.
The former is concerned with making a right choice among avail-
able alternatives and the latter spends its effort in finding
and generating such alternatives. So the two are very closely
related. Inasmuch as decision-making is an integral part of
the goal-changing or goal-serving system, it is, in effect, a
subsystem of the problem-solving system.

The relationship between problem-solving and decision-
making may be viewed as a circular, interacting adaptive pro-
cess. As a general proposition, all problems begin with a
decision, mainly, the setting of or deciding on a desired state,
without which no problem could exist. Setting a desired state
means either, consciously or unconsciously, the setting of objectives or goals or the establishment of social, behavioral, legal, natural or physical standards in terms of the quality, quantity, and time dimensions. Since such a decision represents more or less a statement or an agreement of norms, it does not in itself create problems but rather provides a criterion or reference point which presumably represents the normal actual state. Only when deviation from this norm occurs would a problem (Type II) arise.

The Problem-Solving System

In the last section, we have developed a conceptual framework of the definitions of problems and their implications. Based on this framework we can now proceed to study the anatomy of problem-solving systems.

First let us define what we do mean by the problem-solving. Consistent with the concepts introduced earlier, problem-solving may be defined as a process used to remove or reduce the deviation between the actual and the desired states. By the same token a problem-solving system is simply a mechanism or scheme designed or used for problem-solving. Thus, broadly speaking, any system that controls, or regulates the balance between the actual and the desired states may be regarded as a problem solving system. This includes virtually all of the living systems and human organizations. In this section we shall study the problem-solving system by analyzing the problem-solving process and formulating a generalized model.

The Process of Problem-Solving

To understand the problem-solving process, we seek answers to the following questions:

1) How and when does a problem arise? That is, how and when do we know a problem exists?
2) How to identify a problem, namely, what is the problem?
3) Where lies the problem (or the cause)?
4) What are the alternative solutions?
5) What is the best solution?
6) How to implement the solution?
7) What is the result of the solution?
The first question involves the problem recognition process. This is an extremely important state in any problem-solving process as no problem could exist without its first being recognized or being aware of. A blind man cannot be aware of the danger of falling into the ditch if he cannot sense it. Many problems have grown out of control because they have not been recognized early enough or have been neglected for too long. Failure to recognize problems can be attributed to the failure to establish or specify a desired state and its priorities, to the lack of information, or to the simple lack of a viable problem-solving system. We shall discuss these in turn.

To recognize problems, one must first establish and specify the desired state. Many problems fail to be recognized because of the absence of specific criteria or norms. One immediate example that comes to mind is the environmental and pollution problem. The problem erupted seemingly suddenly, partly because of the rapid qualitative deviation from a desired state, but also because of the simple reason that the standards of environmental qualities have never been well defined or officially established.

If a desired state is the necessary prerequisite for problem recognition, what if, one might ask, one does not know or is uncertain about what one's desired state is? Will one still know whether a problem exists? The answers to these questions depend upon whether one desires to know the desired state or not. If the answer is yes, then he will have a problem of first finding out or deciding what his desired state is and next finding ways to satisfy the desired state specified. On the other hand, if one does not want to know and does not care about one's desired state, there should be no problem. For example, a motorist does not know where he is heading: does he have a problem? The answer depends upon whether he wants or cares to know or not. If he does he is indeed faced with a problem which is first to decide where to go and then to find ways (alternatives) to get there. However, if he is only interested in taking a ride without any specific destination in mind, one direction is as good as another, then he should have no problem. The specification and definition of the desired state is an integral part of the problem identification process and will be discussed in greater detail later.

The second most important requisite of the problem-recognition process is the information system. A problem-solving system without an information system is as good as a living creature without brains, nerves, and senses. The concept and theories of information
systems are a distinct and specialized discipline in themselves; no attempt is made here to explore the field as such. Our primary interest is in the role they play in the problem-recognition and problem-solving process. The information system needed for problem solving should at least consist of the following components:

1) A Memory
2) A Sensor
3) A Measuring System
4) A Processor
5) A Communication system
6) A Control System

The memory unit is an information storage device used to store the information about the desired and the actual states, the methods and mode of operations, the decision rules, etc. It can be in any form or shape ranging from some mechanical means like paper, stone, or magnetic tape to the living cells such as the brain.

To perform the problem recognition function, the information system must be capable of receiving signals, impulses, stimuli, or data by means of a sensory apparatus. These signals may come from the environment or from within the system itself, but must be observable and measurable. The sensor may pick up the signals at the sequence or intervals it chooses or is designed to do. This is the first step in the problem recognition process.

The signals received may or may not be relevant to the problem under consideration or be of interest to the system. They must be processed, namely decoded, sorted, and screened to produce the needed information. For example, while a motorist may be primarily interested in the objects that affect his driving, he is also exposed to various unrelated objects at all times. If he does not discriminate or sort out those irrelevant ones, he would have difficulties concentrating on driving.

For problem recognition, the sensor and the processor serve the purpose best by working together and helping each other. However, as it frequently happens in complex systems, the two tend to work against each other: the higher the efficiency of one component, the greater the burden to another. For example, the more powerful the sensory unit, the greater the ability to pick up not only a larger amount of signals but also the weaker and the irrelevant ones, thus resulting in a heavier load for the processor. Therefore in designing a problem-solving system,
It is desirable to have a signal filtering device to presort the data by blocking out certain unwanted signals. One example in the applications of such a principle can be found in many large organizations where secretaries are employed to presort the mail and prepare appointments for busy executives.

It should be noted that even with a filtering device there is no guarantee that some random interference such as noise, bias, errors, delays, etc., would not find its way into the system. Caution, therefore, must be exercised so that no signals of value should be excluded in this filtering process. As an example, most firms do not keep records of their lost sales because of stockouts. This type of information can mean survival or failure to that firm. Similarly, some social systems are insensitive to their civil discontent or their physical deterioration, and, as a result, culminate in chaos and self destruction as is evident in many of our urban areas today.

We have used the terms "information" and "signals", or "data" on numerous occasions. To avoid confusion, we shall denote the former as the processed data, and the latter, the raw and unprocessed ones. Reference was also made to the effect that the signals and data must be observable and measurable. By observable is meant that the signals or data are distinguishable or detectable by the sensor in terms of sound, sight, smell, or taste, etc. The requirement that artificial odor be added to the odorless gas to enable the user to detect gas leaks is a good example of making an unobservable signal observable. If observability is a key to symptom detection, measurability certainly provides a necessary guide to diagnosis. Measurability implies that (1) there is a definable nomenclature or attribute such as temperature, speed, etc. Obviously a physician cannot diagnose what is wrong with the patient if the symptom cannot be described. (2) there must be some units or scales of measurements, such as bits of information, miles per hour, degrees of temperature, good performance, poor conduct, etc. (3) there must be some method of measurement, such as the diagonal measurements of a television screen or the barometric pressure at the sea level, etc. (4) there are some standards of measurement, such as three feet to a yard or sixteen ounces to a pound, etc.

So far as we have been concerned with the receiving, decoding, and sorting processes. If properly designed and executed, these processes should produce the needed information extracted from the raw data. As such, however, the information does not indicate whether there is a problem. It must be compared with
the prevailing states stored in the memory. This is a collating process, an important part of the information processing system that involves information storage, access, retrieval, and display, etc. This process may lead to one of the three possible outcomes. Either it shows no changes in either the desired or the actual state, or a change in one or both of the states that causes a deviation between them. If a deviation has, in fact, occurred, a problem is said to have been recognized, thus completing the problem recognition process. At this point a decision has to be made to determine whether to pursue the problem further. If the decision is affirmative, the next step is to identify what the problem is, to generate and evaluate alternatives, to make a choice of alternatives, to implement the decision, and to assess the outcome. These steps may be repeated through a problem-decision cycle as shown in the following generalized problem-solving model in the form of a flow chart.
A SIMPLIFIED GENERAL PROBLEM-SOLVING PROCESS MODEL

VARIABLE DICTIONARY

- $D_t$: Desired State at time $t$
- $A_t$: Actual State
- $P_t$: Problem
- $P_1$: Type I Problem
- $P_2$: Type II Problem
- $P_3$: Type III Problem
- $a$: Alternative solution counter
- $c$: Suspected cause counter
- $r$: Alternative relief counter
- $t$: Time counter
REFERENCES


Schools exist to meet the educational needs of the society. They accomplish this through a continuous interaction with their environment. The key aspect of this interaction is information exchange. Information upon which the school is to operate is generated both externally and internally. It comprises the main input to planning, programming, and managing education. Arrangements and procedures with their component entities by which information handling takes place in schools are called Educational Information Systems.

A major problem confronting education today is embedded in the "information explosion." Advances in science and technology are already causing revolutionary changes in the amount, the quality, and the impact of available information.

As a freshman studies his new general-science textbook, he finds much of its content already outdated as contrasted with what he reads in his favorite automotive magazine or ham-radio journal. As his teachers contemplate the selection of instructional materials, they may find themselves inundated by the latest research reports appearing in hundreds of scientific and technical journals. Their problem, by implication, is only a microcosm of the total information explosion that threatens all educators in the near future.

In this era of accelerating social and technological change, planning, programming, and managing education will require new information systems to enable schools to cope with and adjust to change. The "hardware" for self-renewal is already available; the "software" is just over the horizon. If the software is not produced quickly, vital information for decision-making will neither be available as required nor be found in usable forms.

In educational planning and curriculum development,

decisions must be made to resolve:

- what is to be taught
- to whom, when and where
- how learning can best be facilitated
- what resources are available
- how to allocate scarce resources

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- how to evaluate and improve learning, and
- which options shall have priority

... and a host of other daily, weekly, or monthly dilemmas that now bedevil administrators, teachers, school-board members, taxpayers, parents, and students.

Within this problem area, various people must pause to wonder what kind of information is pre-requisite to sound decision-making, where and in what form it can be obtained, and what quantity or quality will be most useful. Developers of information systems must ponder these concerns also, but in addition must predict the intensity and frequency of use, the human, organizational, and technical capabilities of the users, and the sources most likely to generate valid data.

The complexity of the task can be seen graphically in Figure 1 depicting the information interface profile of only one aspect of school decision-making: curriculum selection.
This example depicts a critical situation whose information components are external to the school itself. All these sources—and others—must be considered in designing an information system that can help the school decision-maker.

The interface characteristics of educational information systems are varied as to the degree of formality, structure, intensity, frequency; and as to the content, scope, depth, and relevance of information. In terms of each specific interface, one needs to determine the kind of information output desired and the kind of information handling required, and specifically: who is to initiate the information request; how it is retrieved, analyzed, and processed; in what form, to whom, and when it is presented; and, how it is used and how its use is to be evaluated.

Information systems which link up the schools with their environment aim to ensure that schools have all the pertinent external information they need to operate successfully. But additionally and equally importantly, schools must have the capacity to use such information rationally and effectively. Therefore, the next stage of development will require an educational information system that can operate within the school after the school has been successfully linked to external information sources.

**Figure 2**

**Sources of Achievement Information**

- The Content & Processes Of Learning (The Curriculum)
- Student Motivation & Interest
- Student Aptitude & Achievement
- Teacher Competence, Motivation & Interest
- Other Student Characteristics & Background
- Parent Interest & Background
- Other Entities in the Learning Environment, Their Characteristics
- Parent Attitudes Toward Education
- Motivation, Interest, Aptitude & Achievement of Fellow Students

**THE EXPECTED STUDENT ACHIEVEMENT**
Desired educational outcomes within a given school are generally measured by student achievement. However, many interacting and interdependent factors impinge on any such single objective, as Figure 2 indicates.

Each of the variables depicted in the diagram (and others) affects educational outcomes—and mutually influences each other. The effects of such dynamic interaction can be understood and evaluated accurately only if appropriate information is readily available and processed through an information system built to handle this complexity.

Summing up, in order to cope with information explosion, highly accelerating change and internal complexity, schools have to establish a network of Information Systems. Such a network is to link up the school with its external sources of information. It needs to have a multiple channel capacity to accommodate the wide spectrum of information required for planning, programming, and managing schools. But equally important is the building and maintenance of Educational Information Systems internal to schools. To provide models for the variety of schools, a number of alternative internal information systems need to be designed. In addition, training programs—to impart competencies required to operate the systems—need to be developed, tested, and operationalized.

The design of Educational Information Systems is a monumental task; but it is the successful accomplishment of this task upon which the future of American education might hinge.

The following is a report on an evolving Information Systems model. The Communication Program of the Far West Laboratory for Educational Research and Development is involved in the design and implementation of an Educational Information System. This system is aimed to narrow the gap between educational research and development and its application in schools.

Conceived as an Integrated Information System of three subsystems, it focuses on:

- educational developments of potential curricular applications and
- arrangements and processes for educational planning and management.

The subsystems composing the system are (1) collection, (2) processing, and (3) utilization, depicted in Figure 3.
The Collection Sub-System searches the R and D domain for information relevant to educational planning and developments; retrieves the information, and organizes and stores it in two files: the educational development files and the educational planning files. The educational development files provide base line information to the Information Processing System. It is anticipated that by the end of 1970 descriptions of some 1,000 educational developments will be stored and indexed in these files with speedy retrieval capability. The Educational Planning Files will feed into the Utilization System which is to design arrangements for educational planning and management.

The Information Processing Sub-System organizes information on educational developments in a form to be of optimum use for schools. Products of this system are packaged information units on current developments in a variety of subject matters.
A self-contained, mailable, multi-media information analysis unit, each unit amasses, analyzes, and processes--in a manageable format--tested new alternatives within given curricular or instructional boundaries. On the drawing board we have a plan for a "second generation information system." This system will guide the user to a set of curriculum alternatives in any subject matter domain and will enable him to select the one best fitting his needs and resources.

The Utilization Sub-System includes the production of a set of tested alternative prototypes for schools by which to plan and manage their educational programs more effectively. System-supporting diagnostic tools and training programs will accompany these prototypes enabling school people to assess their capability to plan and manage their educational programs and acquire the competencies and skills required to operate the system.

It is from the kind of research and development I have described here that we can expect to acquire expertise and build program inventories needed to meet the educational information systems needs of the 70's. Faced with ever growing if not exploding information systems requirements, however, our present research efforts are far short of being adequate. It is, thus, imperative that increasing attention and resources be made available for the continuance and expansion of research and development in the design of Educational Information Systems.

I also suggest that the expertise represented by members of the Society for General Systems Research is a resource without which we can not hope to meet the information systems needs of the future.
This paper addresses itself to corporate planning in the round, to the whole subject with special emphasis on the interplay between it and systems analysis. It is much more concerned with the objectives and logic of the planning systems analysis complex than specific techniques and tools relevant to planning. It is frankly partisan and gives a biased view. Furthermore this paper does not pretend to be complete. It does not bother to differentiate between General Motors and the local candy store. Nor does it treat conglomerates or holding companies in the sense of their being aggregate entities, though what is said here may very well apply to their parts.

Systems Analysis: A Continuing Problem in Taxonomy

There is no neat taxonomy as to what falls into the domain of systems analysis and what falls elsewhere. This paper does not provide an airtight or elegant taxonomy. Problems in system dynamics and aggregation form a spectrum rather than sharply defined classes. At what level does a micro model become a macro model and vice versa? Ideally the scientific planner would like to have one model that represents and explains the entire system and its environment. At best he can only construct models of parts or aspects of the system and sometimes link them together in a way that approximates an overall model. Judgment and intuition must be used to supply the rest.

Models of production, inventory and supply have, for example, been linked or extended by the model builder's ability to apply computational methods for arithmetic and logical operations in ways that bring together the models with additional detail that constitute reasonable approximation of a larger reality. Prices, order lead-time changes and order quantity changes (market variables) have already been linked to production-inventory models in ways that suggest that the total value of reduced inventory and production rate change costs can be impressive if the firm would manipulate price and customer service policies in addition to exploiting more economically efficient production and inventory planning. Examples of this
occur in other types of research pursuits such as when an economist wishes to treat the corporation as an elemental decision making unit while another economist finds it desirable to examine it as a hive of individuals -- an organization of extreme complexity.

In any case, the model builder can at present optimize complex models relative to simple problems, or, simple models relative to complex problems. We still await the coming together of greater institutional detail and formal model building relative to complex problems.

Systems analysis is, or overlaps with, many subjects. The broadest generalizations about the content of systems analysis have included such topics as operations research, inventory theory, integer programming, dynamic programming and the construction of algorithms devoted to actually trying to run economic systems. Other subjects have occasionally appeared under the rubric of systems analysis, namely, the economics and processes of information and organizational gaming, simulation and artificial intelligence as they impinge on the understanding of management and academic research activities.

It is naturally tempting, but foolish and demeaning to try to argue whether or not so and so's work, or a particular subject, is really systems analysis or something beyond the fringe, such as purely mechanical topics in operations research or those with a science fiction aura like gaming, simulation and artificial intelligence. I would be the last to argue against those who choose to work in such areas as production scheduling, transportation studies, waiting lines, product-mix problems or optimal assignment problems. However, I can count myself among those who would argue that there is a central core to systems analysis. It contains the art and science of how to build models of various organizational, social and economic phenomena and how to analyze them. It is not, however, merely an exercise in logic or a branch of mathematics. It is the sum of many subjects and has different uses to different individuals. Its major stress in management studies is upon the value of management knowledge and management sciences being pressed together and how they might effectively interact to solve management problems.
Systems analysis is always interdisciplinary and, in my opinion, denotes the kind of research activity that is most suited to the task of developing complex structures relative to complex problems whether they be problems in corporate planning or the problems of finding new approaches to the social control of industry. We turn now to the subject of corporate planning.

Planning: The State of the Art

Planning is an old fashioned subject in textbooks. Yet, it is one of the most strenuous intellectual activities managers can face. The management sciences relevant to planning have developed rapidly in recent years. As a result, theorizing has become more abstract and general than we have customarily taught while the attention paid to the inclusion of institutional detail promises to be even greater than at the present time. New methods of computation and simulation promise to fill in the gap between value free, or abstract, constructions of a corporate system and detail rich, or "institutional story telling", approaches to planning (23) (10)(94).

For example, new dimensions will be added to empirical study of market forms through computer simulations of specific market structures (10) (27). Such simulations will not only permit greater use of organizational, technological and engineering information in addition to marketing information but will also adequately present important time lags and delays that are so critical in characterizing the viability of organizations. Measures of the internal flexibility and decision making capability of economic organizations will be provided through organization studies comprised of a mixture of social psychology, operations research, economics and artificial intelligence. Gaming with models of specific market structures will be increasingly used for experimental, operational and teaching purposes (11)(18)(20).

Closely related to the development of scientific tools and techniques has been the emergence of several path breaking efforts in theorizing. The few singled out here deal with the emergence of the concepts of strategy and contingency planning.
Von Neuman and Morganstern's now famous Theory of Games has been instrumental in causing the concept of strategy to infiltrate the business literature on planning (22). Though few practical applications have resulted, a unified theory for all types of conflict situations was provided. They delineated clearly the concept of pure strategy (one move or a particular series of moves) where, let us say, a firm's R and D programs are characterized by clearly delineated, successive products and markets. A grand (or mixed) strategy incorporates a statistical decision rule for choice of a particular pure strategy in a particular situation.

Boulding (7), Rapoport (24), Schelling (25) and many others have contributed to a new, but offshoot, branch of study which can be best described as conflict study. This particular category of conflict study arose out of the recognition of the inadequacy for some purposes of formal game theoretic models. It is concerned primarily with gamesmanship - the social and psychological aspects of threats and bluffing. A mixture of nearly all behavioral sciences together with political science and social psychology is applied in the investigation of the roles of fear, suspicion and manifestly irrational behavior.

Cyert and March (12) and Bonini (6) among others have emphasized the building of models of the bargaining process within the firm and the need for a behavioral theory that takes into account such factors as learning, perception and modification of goals. They constructed detailed models of the organization of firms, or parts of firms, and were able to introduce new-non-economic variables, thereby familiarizing us with the formal usage of aspiration levels in theorizing about the subject of the firm's planning and decision making.

Finally, the construction of useful simulation models of an economic organization facilitates the experimentation with contingency planning which is old hat in the military, but often slighted in business (27). Given the description of initial conditions of the system, the computer will generate a time series of future states whereby, through varying certain inputs, contingent future states can be obtained. In short, consideration can be given to each possible outcome of an operation and plans can be made for each.
This amalgam of virtually all the formal sciences (logic, mathematics and statistics) and physical sciences, or fields of engineering based on them, laid upon the various divergent efforts at theorizing have produced a certain amount of "fallout" which has affected ways of thinking about social problems and business management. However, a discipline of planning is scarcely begun. But, for the moment, it does appear that the greatest stress is upon special theories which will be of limited scope and considerable application to the unique characteristics of the organization and situation in which planning is carried out.

Perhaps ten years from now the books on planning will successfully blend advanced theory, new ideas in the meaning of measurement and its computation and simulation with institutional detail into a general theory of planning. But to do so would, I believe, require minimal encounters with the general phenomenon called the Law of the Hammer, which says, "If you give a five year old boy a hammer, he will soon discover there are a lot of things in need of hammering." Given the assortment of tools and techniques we now have, it will be difficult to avoid stumbling upon a large number of things in need of computing, simulation, gaming and modeling. Serious recognition of "dead ends" is mandatory if we are to avoid serious malaise in the development of a discipline of long range planning.

One fact is certainly clear. A set of difficult problems is hidden behind a title of two or three words (cancer and vascular disease are examples of two others). Nevertheless, something has trickled down which permits some guidance to corporate planning to be set forth at a general level. Let us begin by first examining, briefly, the concept of long range planning.

**Long Range Planning: What It Is or Is Not**

Conceptually, planning in the long run sense is a formalized process of anticipating future states of the system at some future times. Current decisions together with their commitment of current resources in certain specified ways are essential in order to arrive at a predicted or wishful future state. A more inclusive and descriptive definition was given by Peter Drucker (14). He defines planning as
a continuous process of making present entrepre-
neural decisions systematically and with the
best possible knowledge of their futurity, organi-
zizing systematically the effort needed to carry
out these decisions, and measuring the results of
these decisions against expectations through organi-
zed systematic feedback.

Four key aspects characterize planning and are as
follows:

1. Forecasting and the anticipation of possible
future states of the environment and business
conditions to which the corporate system will
adapt.

2. Opportunity analyses which reflect some wish-
ful future state(s) and requires current organi-
zational effort expenditures to secure or bring
about the wishful state(s) of the system.

3. Design of specific actions to bring about de-
sired changes in the state of the system.

4. Measurement of results against planned actions
over the course of predetermined time series
of events.

As has been often pointed out by many other writers
on the subject, long range planning is decision making
and not merely an excuse for doing nothing. But not all
decision making is long range planning. It has been con-
ventional to classify decision making in the firm in order
to lessen some of this ambiguity. Three major classifica-
tions have served this purpose -- strategic, administrative
and operating decisions (3).

Strategic decision making is taken here to mean long
range planning and includes all decisions that are entrepre-
neural in nature. That is, their futurity is often five
to ten years ahead, or longer, and by their very nature are
very difficult if not impossible to reverse. Perhaps the
ultimate distinction between this set of decisions and all
others is that strategic decisions deal exclusively with
enterprise objectives. Their focus is upon enterprise ends
in addition to their requirements for important resources.
Administrative decisions and operating decisions are generally taken below the corporate level of management. Both are directed toward the means by which to pursue stated enterprise objectives or goals. They are, in this sense, tactical decisions rather than purely strategic. Both classes of decision making are concerned with the problems of planning and controlling resource conversion to maximize the objectives of current operations. On the one hand, administrative decisions have to do with such problems of organization as authority-responsibility relationships, the materials flow of information and work as well as resource acquisition which would include among other things plant equipment, financing and all personnel functions. Operating decisions, on the other hand, are concerned with current, or short run, resource allocation and includes such problems as pricing, production scheduling and functional budgeting.

It is a very short conceptual jump from this system of classification to the general principle that governs the planner's ideal state -- "structure follows strategy". What this principle conveys is that administrative and operating decision making are not to interfere with, distort or otherwise obscure the clarity and precision of long range plans. Above all, correction of current or past administrative and operating decision deficiencies should never be confused with long range planning.

Thus, strategic decisions are genuine decisions, not between more or less information, but between equally possible courses of action at the level of the total enterprise. They are distinguishable from all other decisions made in the firm by certain formidable attributes. These attributes, by the way, also illuminate the manager's difficulty in converting this kind of general thinking into allocation of important resources and measurement of results. They are as follows:

1. These decisions are large and are comprised of sets of sequential decisions because they often cut across all major decision-making bodies in the organization. Additionally, all decisions must be continuously reviewed in the light of decisions made subsequent to them.
2. These decision sets are represented by differing time spans and risk, yet they are all interrelated. Each decision set, or sub-set, has to be analyzed separately, but cannot be substituted for one another.

3. Since all decision sets are complementary, their planning must be accomplished before actions to be taken are actually necessary. Few experienced managers are totally unaware that substantial parts of, or all of, long range plans may have to be changed from time to time as prediction or desire become reality. Corporate planning is therefore properly viewed as a continuous process.

It is not the concept of long range planning that causes the greatest difficulty. Rather, it is thinking through the approach to the job and the management of a continuous planning process that mitigates heavily against systematic organization of the planning process into practical jobs. I said earlier that this is a general subject dealing with planning theorizing. But it is also a very practical subject that deals with concrete task of corporate management. There are, in other words, visible approaches taken, or points of view, to planning that those who observe the process can discuss and evaluate. Contributions to the understanding of this complex management function have come from numerous sources. There is no one philosophy, or approach, which incorporates all developments, therefore, it is not possible to draw sharp distinct lines separating these approaches.

Planning Approaches: A Survey of Four Philosophies

Pre-Managerialist. Alfred Marshall's partial equilibrium analysis produced the now primitive concept of the single product, atomistic firm in a stable environment which is run by an individual owner who is first and only a profit maximizer and uses only production and price as the strategic variable. In the frictionless and institution-free market, the profit maximizing owner combines factors of production by setting marginal everything to marginal everything else. This has long been the economist's concept of a businessman, namely somebody who adapts to changes in the environment.
The usefulness of this theory in economic analysis and elsewhere has been radically challenged over the years. Among its many critics, some have foresworn the profit maximizing approach because it fails to recognize trade-offs between investment for current profit and those for future payoff. Others have attempted to replace what they criticize with theorizing of their own. Morris, Bonini and Cyert and March are among those who have tried to add more institutional detail to theorizing, thus characterizing the firm as an organization.

Their recognition of the presence of technical, financial and political constraints strongly suggests that some behavior other than value free maximizing decisions must be pursued in order to recognize competing interests. Thus, decision makers are presumably forced to weigh the opportunity costs incurred by choosing any of the alternatives they face. Herbert Simon offered a persuasive alternative hypothesis about the objectives of firms. Firms are said to "satisfice" (a term coined by Simon) instead of maximize.

Satisficing: A Basic Viewpoint. "To do well enough; to set goals high enough, but not too high," bespeaks the satisficing philosophy. Managers recognize implicitly or explicitly the complexity of calculations and imperfections of the data which must be used in any optimality calculation. Thus, firms frequently give up the attempt to maximize anything, profits, sales or anything else. Managers will therefore select some minimal standards of achievement which hopefully will assure an acceptable level of profits. Like the economists' entrepreneur, the satisficer adapts to changes in his environment. But they differ in one important way -- the satisficer's choices are grounded in the miasmal swamp of reality.

Ackoff has suggested that the objectives set by the satisficer are generally few, or just one, and uncomplicated though not unambiguous (1). Whether the objective(s) be of profit targets, service, a rule of thumb for pricing, inventory levels or a fixed percentage of revenues automatically set aside for advertising, they will be developed out of the strong belief in the "art of the possible" as opposed to seeking out the best possible, or optimal, way. The satisficer recognizes rules of thumb for what they are -- rough, but serviceable management tools.
Cyert and March have lent further insight into this planning philosophy. They attempted to develop what they call a behavioral theory of the firm which seeks to show how firms really act, not just how they ought to act if their decisions were all optimal. Their theorizing is an attempt to persuade us that because "organizations do not have objectives, only people have objectives" the firm's objectives are in reality a negotiated consensus of objectives of the organization's influential participants. No indication, by the way, is given by them as to exactly how particular objectives evolve.

We are, therefore, led to believe it axiomatic that the satisficing firm will avoid any internal organization disequilibrium in, or as a result of the planning process. Thusly, the management assures itself of achieving an orderly, operationally feasible expansion path of important resources in the firm's pursuit of an acceptable level of profits.

In general then, the satisficing firm displays little or no predilection toward using organization change or optimality conventions as active elements in the planning process except perhaps where past deficiencies may impede current and future negotiation of a consensus of organization participants. Juxtaposed to this planning philosophy is that of the optimizer.

**Optimizing: Its Role in Planning.** The optimizer is predisposed to "do as well as possible" rather than well enough. This philosophy has its band of followers who display a "rational passion for rationality." It is important to stress here that the general subject of operations research and the management sciences is not long range planning and vice versa. The areas of interaction however, are large in this planning approach and it behooves us to be aware of and understand them.

Instead of starting with some fixed target figure, say as market potential for some period in the future as would likely be done by a satisficing firm, the optimizer would begin with the proposition that market potential, or sales, depends on a host of variables under the control of the businessman. Thus, optimizing deals with an array of possibilities. It is the antithesis of the satisficer's approach.
The essential feature of optimality analysis is to take alternatives into account and identify which possible sets of decisions come closest to meeting objectives, that is, which are optimal. In his employment of operations research techniques, the planner does not pretend to actually be able to find all alternatives. The state of the art in the availability and gathering of greater organizational detail and the bluntness of tools of analysis generally permit little more than plausible or likely approximations of the true optimum. The optimizer seeks to at least do better than old standard rules of thumb. As always, "the proof of the pudding is in the eating."

The optimizer's array of possibilities in meeting the firm's objectives may include a change in the internal structure of the organization or operating policies and practices. But only in the sense that such modifications are necessary to support or augment "new management technology" and never as an active element to secure some suggested strategic option open to the firm. Generally speaking, optimality analysis takes the corporate system structure as a constant.

It is not too difficult to perceive a general coalescence between satisficing and optimizing behavior -- accompanied by a reasonable degree of sheer business acumen -- occurring in a firm. This may in fact be a very plausible explanation of the state of the art in the real world. If it is, the importance of the marriage between the two approaches is likely to be found in the optimizer's search for greater detail of the firm's operations and the subsequent exploitation of the values inherent in systematic management research. As the level of the planner's familiarity with and understanding of the system structure increases, the potential for adding greater richness of institutional detail to modeling, simulation and evaluation will surely grow.

Adaptive Planning: An Increment in the State of the Art. Underlying this approach is a commitment to the belief that substantial elevation of the level of long-run enterprise achievement will result largely from the future that the management is capable of bringing about. This, in contradiction to planning with an eye only to what the future is expected to bring, requires deliberate, conscious invention of the opportunities and the strategies to achieve them. As others have carefully observed, this approach to long range planning is not prevalent today even though "innovative planning" is a familiar concept to businessman.
Accordingly, the adaptivizor approach differs from all the others in the following important ways:

1. It supplants the need for correction of deficiencies that often occurs in the planning process by securing a redesigned corporate system structure that is built to respond more "naturally" to external and internal changes.

2. All parts, sub-systems or aspects of the total system are considered active elements in a search to exploit a defined desired or wishful future state of the corporate system. The design of the total system itself is never considered to be in a frozen or final form.

Adaptive planning retains the commitment to heavy or intensive management research carried out in optimality analysis. Like the optimizer approach, the characteristics of the management of the planning function will tend to emerge in large measure from the nature of the management research function carried on in the organization. Adaptive planning rests squarely on the importance of encouraging a free creative environment for planners in the organization. In turn, the need is created for an organized stored memory of knowledge and experience which can be systematically scanned and searched through. Such knowledge and information requirements are of a far greater magnitude than would normally be found in any other organizational approach to planning. Indeed, the moving target aimed at by an adaptive planner is the insights and understanding of the total system being managed and what he learns while going after pre-selected factors that are assumed to make up a complicated ever changing process. In short, the payoff is believed to reside in the planning process itself which, in turn, depends critically on the internal organization environment as it impinges on free creative processes in the firm.

Other writers, who have pursued these adaptive planning characteristics in more detail, suggest that the total corporate system is, properly viewed, a learning system (1) (14) (20) (32). Specifically, the details
of internal operations (all sub-systems) are to be integrated in a manner that produces "natural" or self-corrective responses to deviations from planned performance of the internal sub-systems and to changes in the total system's environment. Ackoff refers to this organizational behavior as "passive responsiveness." Deficiencies in the details of system operations are treated as just that by management and not construed as a constituent part of long range planning. Stanley Young has provided an admirable treatment of the nature of system design problems as well as a guide to designing and evolving management systems (33).

Beyond this, the total corporate system is considered thoroughly viable with regard to the generation of strategy options (opportunity analysis) that may require a change or redesign of any or all parts of the total system. This is the companion characteristic to passive responsiveness, namely, "active responsiveness." Planners are presumably engaged in a continuous effort to redesign (or reinvent if you will) parts or aspects of the total corporate system. Both the job of integrating the parts or subsystems into a larger whole and the interior redesign of the parts or subsystems are deliberate acts of reinvention which are known to offer the firm some specific long range achievement. Ackoff, a few years ago, provided an experimental approach to the reinvention of pedagogical systems in institutions of higher learning (1). The recent work of an interdisciplinary research group (of which I was fortunate to be part of) at the University of Massachusetts provided an experimental model of a reinvented elementary education teacher trainee program in the School of Education (30). Each of these are interesting examples of approaches to the highly promising experimental basis in systems analysis and design.

Young's treatment of the system design subject calls appropriate attention to one other crucial implication of adaptive planning on the internal organization of the firm. Emergence of the adaptive planning mode creates the need for a new management function -- a total system redesign function. I have already asserted that planners
will attempt system redesign. But beyond this continuous activity, the actual responsiveness of the total system becomes a problem in monitoring the actual performance of the system over time, given its expected performance. Such a management function (organizational unit) would monitor and detect deviations in performance of the total system and its parts or subsystems in a manner similar to those followed in the management of all other internal functions such as production or marketing. Paul Lawrence and Jay Lorsch have suggested a comparable management function for consideration in research and development intensive firms which they call simply, "the integrator" (22).

In conclusion, the common way of thinking in terms of simple cause and effect -- the Newtonian mechanistic view -- is replaced by new awareness: of many causes, constantly producing varied effects, in what are really complicated and dynamic systems. From the standpoint of a firm's exploiting the possibilities inherent in this planning approach, it is only possible, I believe, with a view toward the application of systems analysis. Through the use of systems analysis planners and managers are pushed outward from the current limitations in model building and the handling of greater institutional detail relative to complex problems. It is fair to say that planning for a planning system means, precisely, the invention of the means to evolve an essentially redesigned management function. Hence, systems analysis can be viewed as a hand-maiden to the inventive process. For if an improvement in the state of the art in long range planning is to be achieved, it must be invented.

Summary

We've added to the stock of knowledge about long range planning--this at the cost of abandoning the firm as a primitive concept and describing it as an organization. Logical consistency between one theory or approach to planning and another is a luxury and not a necessity. Each approach should be constructed in order to answer a limited set of questions. Thus, the pre-managerialist theory of the firm in a freely functioning price system is not going to match a theory of the firm as a collection
of individuals who coalesce in their aspirations. In turn, both satisficing and optimizing easily fail to match the adaptivizor which is at a different level of conceptualization.

There is no particular paradox in the failure of the different approaches to dovetail. Frequently a great amount of insight can be gained by asking why they fail to be consistent with each other. The examination of the inconsistency can itself have a high payoff in isolating fundamental difficulties. It is important to convey to others where the weaknesses in modeling are and why consistency between approaches to theorizing is not necessary. If nothing else, the manager may be informed as to what he is deciding about in his choice of planning approaches, let alone on his strategies and objectives.

This curmudgeonry about systems analysis led me to speak of it as an interdisciplinary approach to organizing the planning process rather than as a fight for academic territory, status, prestige and defining the scope of a discipline. Long range planning is probably not an elegant subject when really well done either. The treatment here of both subjects reminds me of the story of the centipede with sore feet who came to consult the wise old owl. "Walk one inch above the ground for two weeks" exhorted the owl. Whereupon the centipede asked "How?" "I've solved your conceptual problem, don't bother me with technical details," replied the owl. Pure theory has triumphed again! But it is precisely the questions of the technical problems such as the details of how and why approaches differ, how to organize and systematize planning approaches and how we emerge and actively manage the planning function that systems analysis can address itself to. We need a dozen, or so, first class Ph.D. theses in this area.

The development of tools and techniques of management sciences are moving the state of the art in planning outward from the traditional methods. Much in the approach and organization of the planning job remains unresolved.
However, we currently possess the capabilities necessary to bring greater institutional detail together with modeling, simulation and gaming techniques. The steps already taken that were briefly discussed in this paper should at least give credence to the claim that we are moving toward the place where long range planning ceases to become entirely a matter of skill and experience and assumes some of the characteristics of a discipline.
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The Evolution of Ecological Theory

Edgar Taschdjian

Summary:

This paper makes a historical survey of ecological theory and of the interpretations given to various fundamental concepts, such as environment, climax, niche, ecosystem, adaptation, etc. It emphasizes the difference between classical ecology oriented along botanical and zoological principles and modern approaches in which man is an integral part of the ecosystem and not merely an external disturbing factor. It also emphasizes the importance of the time factor and of entropy for the predictive value of ecological theories. Examples of systems analyses applied to ecosystems demonstrate the methodology used in modern attempts to describe energy transformations in man-nature systems. Finally, it is emphasized that ecological theory is unable to provide us with criteria for our behavior as part of the ecosystem and that a normative code of values or priorities is required if ecological information is to be used for managed ecosystems.

In attempting to apply concepts from General Systems Theory to ecological problems, it seems prudent to familiarize oneself with the history of these problems and with the various formulations developed by biologists in the past. Hopefully, this will help us to avoid pitfalls in which ecological theory has been trapped and from which it has been trying only recently to disengage itself.

The term "Oekologie" was coined by Haeckel, one of Darwin's greatest admirers, to denote a science dealing with the totality of interactions between the organism and its external environment. The interactions between the organs were denoted by the term "internal environment" (fr. milieu interieur), a concept formulated by Claude Bernard. (1) Since the external environment is

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the world as a whole, it is obviously too large a system to be analyzed. One therefore attacks it piecemeal by subdividing it into a) the abiotic environment comprising the lithosphere, the atmosphere and the hydrosphere, b) the biosphere composed of a botanical and zoological compartment and c) the psychosphere or noosphere. (2, 3) Ecology started out as a branch of plant geography and aimed at becoming an exact, natural science. (6) It received its first impetus by Darwin's theory of natural selection and it is therefore not surprising that early ecological theory consisted essentially in attempts to provide examples for the effects of competition and in attempts to demonstrate survival values in the phenomena of plant succession leading to an ecological climax. The intraspecific and interspecific exchanges of matter and energy were given the name "ecosystem", a term coined by Tansley. (7)

Man and his interactions with the environment were usually excluded from early studies of the biosphere. His responses to physical stimuli were studied by the science of physiology and his interactions with other men were relegated to the field of sociology outside of the natural sciences. (4) The interactions between man, plants and animals were treated in such technological sciences as horticulture, agronomy and forestry. In talking of the external environment of a plant or animal species, early ecologists conceived it as a quasi-average of a few selected external conditions. (5) It is significant that psychological and symbolic interactions were not considered as belonging into the study of ecosystems and that therefore human and animal behavior patterns were irrelevant for its study.

In Darwinian theory the influence of the environment on the survival of a species results from the Malthusian discrepancy between food availability and population growth. The organism responds to the environmental challenge either by an adaptive modification or by extinction. Exploitation of the weak by the strong was merely a part of the stern discipline of nature which eliminates the unfit. (8)
The Darwinian orientation of animal ecology is demonstrated in the search for special adaptive features which were to be correlated with the population numbers of a species. It was found, however, that the adaptive value cannot be determined for a single feature, but only for the total set of interrelated features. What is adapted is not the wing length or the leaf, but the animal and the plant. (9) One feature may compensate for another, e.g., drought resistance in plants may be achieved either by a larger root system or by a reduced transpiration surface. (10) Such vicarious functions occur not only in the organism's responses, but also in the environmental challenges; for instance, a change in the photoperiod may have the same inducing effect on flowering as a change in temperature. Consequently, the term "ecological niche", which originally referred to some kind of microhabitat, was redefined as a functional environment. Whereas the term "habitat" now refers to the location of an organism, the niche refers to its profession in the ecological business world. (11) Adaptation is therefore a multidimensional relationship, not only in the human sphere, but also among plants and animals. No two species are even likely to have identical niche requirements and interspecific interactions involving cooperation are at least equally important as those involving competition. (12,13,14)

Since biologists were unable to define any particular feature of an organism which makes it more or less adapted, they tried to define adaptive value by the mean contribution of an organism to the gene pool of the succeeding generation. According to this Neo-Darwinian view, the "fittest" is nothing more than the parent of the largest family. An individual may be strong and hardy and live to a ripe old age, but if he does not leave any offspring, his Neo-Darwinian fitness is zero. Conversely, a hereditary disease which strikes after the close of the reproductive period would not diminish the adaptive value
of the genotype. (15) Natural selection, then, consists merely in the fact that adapted organisms leave more offspring than others and, if one asks which are the ones that leave more offspring, the answer is: Those which are adapted. It is obviously a tautological and vacuous statement. A Neo-Darwinian biologist tacitly assumes that an animal that leaves the largest number of offspring will also be best adapted for eating a peculiar vegetation or for surviving a certain infection. But a mule may be able to do this better than a horse, yet it does not leave offspring and is therefore non-adapted in the Neo-Darwinian sense. (16)

Due to these and similar findings, biologists have arrived at a concept of the niche which is organism-directed, organism-timed, organism-ordered and organism-spaced. Mason and Langenheim call this kind of functional environment operational in contrast to the concept of a potential environment. (17) We are dealing then with a triadic relationship in which the organism does not merely suffer the influence of the environment, but creates it as well. (18) This concept of an organism-created environment is diametrically opposed to the idea that in a stable ecosystem the food potential, even though unknown quantitatively, is nevertheless a constant, so that its per capita share decreases with increasing population numbers in a reversible manner. Even if this were so, the fraction $R \ (R = \text{Resources}, \ P = \text{Population})$ representing the standard $P$ of nutrition, would be a constant only if the per capita consumption of food would be a universal constant for all members of the species. Only then could the reversible linear relation $R = k$ be used for demographic or ecological $P$ predictions. Time does not play any role in such a reversible linear relation. (19) Unfortunately for this simplistic view, the position of an organism in the interspecific network of an ecosystem is not time-invariant.
The channels which connect it with other species change at different times of the year and at different periods of an organism's life. A caterpillar will live on specific leaves while the emerging butterfly will live on nectar. Very little is achieved, therefore, by classifying the organisms as producers or consumers. A wheat rust is a saprophyte at one stage and a parasite at another. The intensity of the nutritional interaction between two species is not only density-dependent, but also efficiency-dependent. Whether a lion will eat a zebra depends not only on whether he encounters it, but also on whether he or his cubs are hungry. (20) A predator may substitute one prey for another. Therefore the frequency of interspecific interactions may vary from zero, when a food is not used or not available, to 100%, when one type of food is used exclusively. (21)

Ecologists thought that they had taken care of the time factor in ecological processes by developing the concept of an ecological succession leading up to a stable climax community. It has been realized gradually that even if man is left out of the picture, so many natural events, such as hurricanes, fires and frosts, disturb the "normal" succession as to preclude its use for predictive purposes. (22) Ecologists can predict the composition of an isolated climax community in a constant environment, but they cannot predict discontinuous environmental variations and therefore they cannot predict deterministically the time required to reach the steady state. (23, 24) Actually, the steady-state climax is not a single state, but a continuous oscillation within a certain range. (25, 26, 27) The interest of ecologists in the climax state is based on the tacit assumption that this state maximizes the stability of the system as well as its efficiency measured in terms of biomass. The smaller the fluctuations, the greater the stability. (28, 29) The stability depends, however, not only on the number of species composing the system, but also on the complexity of their interactions.
Parasites and predators are euryphagous

Herbivores and carnivores, all euryphagous

As regards the efficiency of a climax community, a very fundamental point has been raised by Odum and Pinkerton. They emphasize that in any open system in which energy is transferred between two subsystems, a maximal efficiency goes together with a minimum power output. Consequently, since such systems tend to maximize their power output, not their efficiency, the latter can never exceed 50% of the ideal, reversible efficiency which characterizes the steady state. This means that the greater the number of links in the trophic chain of an ecosystem, the greater are the entropy losses. In a climax community, all the energy input is completely used by leakage and maintenance and no sustained output is available for harvestable crops. This statement is in good agreement with the results of those

*Euryphagous = broad-dieted, as distinguished from monophagous or narrow-dieted.
ecologists who studied animal behavior and who found that animal populations do not multiply to the point of starvation, but limit their numbers to an optimum density by conventional territorial rules enforced through signals. (31)

The point is that the animal community does not produce the largest crop of animals possible for a given food supply, but is self-limiting, maximizing the well-being of the individuals rather than straining their efficiency to the maximum.

The interaction between predator and prey or plant and herbivore can be represented by a negative feedback which stabilizes the system. But there are also positive feedbacks, such as the animal excrements which fertilize the pasture. In an ecosystem of which man is a part, the work of people on a farm facilitates the flow of light energy into food storage. A work flow which facilitates a second flow in proportion to its activity is a multiplicative positive reward feedback. In natural ecosystems, such positive feedbacks are restricted to geochemical recycling systems. But in a man-nature ecosystem, a positive feedback may take the form of money paid for work done. Thus money moves upstream in the opposite direction to the downhill flow of energy. In an industrialized society utilizing fossil fuels, work is not done by animals, but by machines, so that most of the work done by man and draught animals is eliminated. Thus the cities contribute to the agricultural output by monetary reward loops and urban workers are really farm workers but don't know it. (32) The flow of energy in such a man-nature ecosystem can be modeled by the use of symbols for energy sources, energy sinks, energy consumers, work gates and monetary feedbacks, as indicated by Figure 2.
People concerned with ecological problems in modern industrial society, such as water and air pollution, either adhere to the pristine theory that nothing should be allowed to alter the "natural" condition of a climax community or they admit that a certain amount of alteration is tolerable and unavoidable. (33) We have seen

In Figure 2, the monetary reward feedbacks are denoted by man's control of power flows at the upper right corner of the figure. Man's choice of crop plants, fertilizers, and other technological procedures determines that portion of the energy input which goes into the sinks and consequently is the main factor governing the input-output relations.
that a climax community is one which has a zero output as far as mankind is concerned. For better or worse, man has become part of the ecosystem, but this does not mean that in order to preserve the stability of the system we have to preserve all possible forms of life. Just because mankind has evolved in the presence of mammoths and sabre-toothed tigers does not mean that we can't live without them and should try to preserve them if they still existed. This means that mankind cannot, and never could, rely on the environment to provide a "natural law" for optimal ecological relations, but must formulate arbitrary and selective human laws for the management of the human ecological environment. The choice is not between a natural and a managed system, but only between a managed and a mismanaged system. Ecology is a form of biological economics. We have abandoned free competition since Keynes in human economics, but we still adhere to the fictitious equilibria of a Ricardian theory in ecology.

In a managed ecosystem, the channeling of the flow of money is the critical factor which determines the output, the stability and the information content of the system. Whether we decide to spend money on a dam construction, on pest control, on sewage treatment or on reforestation will make the difference in the evolution of the ecosystem of which we are an integral part. The minimum entropy or the maximum information content is present in an improbable ecological system which requires continual energy input for its maintenance. In a monoculture, such as a cornfield, the information is maximized and the only entropy leaks are the weeds which are nature's attempt to disrupt the improbable system created by man. (34) The only way to decrease the instability of this system is to increase its heterogeneity so as to multiply positive and negative feedbacks. In other words, we should not maximize the information content of the system, but optimize it. The choice between these two prescriptions is that between a cornfield and a garden. A climax community is analogous to a series of letters obtained by letting a chimpanzee hit a typewriter at random. A cornfield corresponds
to a repetitious series of a single letter. A garden can be compared to a message with a meaning, obtained by a biased, non-random selection of signals from the available information source. Such a planned diversity has also been advocated recently under the term "integrated control" by Upholt and Kraybill. (35)

In such a managed system, the constraints of the information source are given by the physical and climatic environment. But besides these naturally given constraints, there are also human constraints, such as the importance attributed in the utilization of a water resource to the production of electricity versus the importance attributed to recreational uses. (36) It is up to the sender to choose, to increase or decrease the probability of an ingredient by structuring the channels of positive feedbacks. Since man is an integral part of the ecosystem, his choices will determine not only the frequencies of plant-and animal species, but also the frequency of the human species. We have the choice and freedom of determining how much money is spent on population control or on pollution control and the allocations we make will determine the evolution of the ecosystem in which we live.
Evolution of Ecological Theory

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Man has always been fascinated by the processes of decay. Perhaps nowhere is this clearer than in the field of the arts. Thomas Mann, for instance, traced the rise and particularly the fall of the merchant family of Buddenbrooks in the age of industrialization; and his Death in Venice recorded the decay of a man in a decadent environment. Similarly, Josef Roth has given us a remarkable sense for the disintegration of the Austro-Hungarian Empire in his Radetzky March. Roger Martin du Gard's focus was broader still: His Summer 1914 detailed both the deterioration of the solidarity supposedly underlying the Second International and the collapse of Europe's political system in the days that preceded the outbreak of the First World War. Uncounted novels and, more recently, movies such as Repulsion have tried to depict the disintegrating personality structures of individuals.

Nor are we bereft of competent historical studies of systems in decay. On the level of empires, they range from Gibbon's analysis of the fall of Rome (1776-1788/1932), to Kann's interpretation (1957) of the end of the Austro-Hungarian Empire, and perhaps to the decline of the contemporary empires controlled by the Soviet Union (Ionescu, 1965; Brzezinski, 1967) and the United States (Steel, 1967). On the level of the nation-state, the most studied example of the process and effects of decay may be Germany of the Weimar era (e.g. Bracher, 1960) and the Nazi period (e.g. Bullock, 1964). Still other scholars have focused upon the breakdown of such artistic movements as the troubadours of 13th-century Provencal France (Pernoud, 1950), apocalyptic movements (Festinger, Riecken and Schacter, 1956), business organizations (Burns and Stalker, 1961), voluntary associations (Gusfield, 1955), and the personalities of such men as President Woodrow Wilson (George and George, 1956).
What is surprising, given this degree of literary and scholarly interest, is the virtual absence of systematic, cross-level studies of the process of decay. Indeed, the only one with which I am familiar is James G. Miller's excellent analysis of the concept of systems (1965b; 1965); but even that does little more than to suggest that the subject needs more systematic work. This paper seeks to bring together some cross-level aspects of decay in various types of systems, particularly social systems. In this sense the paper represents the first of Miller's three-step procedure (1965a, p. 215) for demonstrating a formal identity among concrete systems: "recognizing an aspect of two or more systems which has comparable status in those systems." Even this task is difficult. As Donald T. Campbell (1965, p. 31) has noted:

There is bound to be a lot of the purely fortuitous or non-transferably specific in the life or death of a single biological individual or social system or culture item. For a systematic selective criterion to make itself felt above this "noise level," there must be numerous instances involved, and a high mortality rate. Thus we would be more apt to expect effective selective criteria to exist for neighborhood laundry organizations than for national organizational form.

At some later point in time, and on the basis of more examples and case studies than can be presented here, it may be possible to pursue more systematically the development of cross-level hypotheses about decay in systems. Then and only then will it be possible to move beyond the level of pre-theory, that is, following Miller's outlined procedure, to hypothesize and empirically test a quantitative identity between apparently comparable aspects of two or more systems.

The Growth and Decay of Systems

A system, in brief, is a collection of relatively stable elements connected by some regular patterns of interaction in such a way that changes occurring in any one component have regular—that is, predictable—effects on
other components. Implicit in this definition are four major points. First, structures are those components of the system that are relatively less subject to change. Second, relatively more subject to change are its processes or patterns of interaction. Third, the regularity of the patterns of interaction is probabilistic. Thus if we assert that a country such as Norway takes a position in the United Nations similar to that of the United States, we may be saying that it does so 95 per cent of the time or only 67 per cent of the time, or that the precise percentage varies, according to the type of issue. The point is simply that, in this case at any rate, it is possible to establish the frequency distribution of patterns of interaction. When this is so, we can predict future behavior with some degree of confidence. Fourth, there are discontinuities or boundaries between the system and comparable systems in the environment. In the case of social systems these boundaries may comprise linguistic, cultural, political, or other discontinuities. To the extent that information (inputs and outputs) crosses these boundaries, the systems can be called "open" systems.

Although some systems remain static over time, others grow and decay. Growth is an endogenous increase in a system's size or capacity to perform important functions. In this sense the first definition offered by Webster's Seventh New Collegiate Dictionary for the intransitive verb "grow" is relevant: "to spring up and develop to maturity." Thus we speak of trees and children growing in size. And we also speak of individuals maturing, that is, becoming better able to perform the tasks of adulthood. At a minimum these include the maintenance of a dynamic equilibrium internally (in body and mind) and with respect to the external environment. But a farmer's holdings also increase in size if another plot is added to those which he already controls. In this sense Webster's second definition is pertinent: "to increase in size by addition of material either by assimilation into the living organism or by accretion in a natural inorganic process (as crystallization)."
Decay, by the same token, is a decrease in a system's size (whether because of internal or external processes) or an endogenous decrease in its capacity to perform important functions. Within the system, internal conflict may increase among the components, overloads of information may cause malfunctioning of the components, rigidity may replace flexibility in adapting to the environment, and, ultimately, the individual components may disaggregate themselves, that is, break away from the system. This concept of decay, to which we shall return later, is what systems engineers would call "entropy," that is, roughly, "nature's statistical tendency to disorder" (Weiner, 1956, p. 28).

**Mechanistic Systems.** In our search for analog appropriate for the study of decay in social systems, a good place to begin is the mechanistic system, however inadequate it must ultimately be. A mechanistic system, such as an internal-combustion engine, is fairly simple to understand. It is possible to diagram its functioning fairly well, to measure aspects of its performance (e.g. input-output ratios, such as revolutions per minute gauged against the input of gasoline and air), and, through adjustments in the organization of the mechanism (e.g. changing the gear ratio of an automobile), to alter the output without significantly changing the input. Moreover, the trained mechanic can take such a system apart, replace any of its components, and put it back together again without damaging the engine's capacity to function effectively.

If the inputs, environment, and internal structure of the mechanism are held constant, then it should function over time at a roughly constant level of performance. As any owner of an automobile knows, however, this ideal is rarely if ever realized in practice. Friction, corrosion, and metal fatigue, no less than accumulations of grime from the air of our smog-filled cities, contribute to a decline in the performance of the engine. It is possible to retard such decay through preventive measures, such as lubrication, proper cleaning, and the use of anti-corrosive coatings. Even so, parts will wear out and require replacement.
It is this perfect divisibility of the system into its component parts without destroying the whole and the infinite possibility of replacing any existing component with an identical substitute that distinguish mechanistic or non-living (Miller, 1965a, p. 203) systems from living systems such as organisms and human societies. In such mechanistic systems, decay is reversible. In principle, at least, we can rejuvenate Grandpa's Model T Ford. The cost of doing so may be exorbitant. And the purchase of a new automobile may well be both less expensive and more efficient in terms of providing speedy, reliable, and comfortable transportation. If, however, our goal is to attain the prestige accruing to owners of antique automobiles, then the financial cost of reversing decades of decay may be justified.

Organisms, by way of contrast, have only imperfect divisibility, and accept replacement components only imperfectly. It is true that a skilled surgeon or even a contemporary Jack the Ripper can dissect the human body into its constituent parts. To date, however, no one has solved the "Humpty-Dumpty problem"—putting it back together again. Similarly, possibilities for blood and marrow transfusions and cornea, liver, kidney, and heart transplants notwithstanding, even a complete organ-bank would do little to halt what appears to be the inevitable process of decay in human beings due to aging (Comfort, 1964, pp. 277-278). Life scientists will nonetheless continue the search for the means to make man immortal.

Living Systems

Howard J. Curtis (1966, p. 120) neatly outlined the biological aspects of aging in five types of living systems:

1. Single-celled organisms are essentially immortal, although there is evidence that some of them must undergo a form of sexual reproduction occasionally.

When a unicellular organism divides, wrote Carl P. Swanson (1960, p. 96), "the life of the single cell becomes part of the life of two new cells, and as long as the species lives so does the cell whose life, then, stretches in an
unbroken chain back to some original cell in the past." More complex cells decay and die. Indeed, Swanson (p. 97) noted the estimate of some biologists that "the human body loses 1 to 2 per cent of its cells through death each day." But what causes this decay and death is the subject of intense dispute among biologists.

2. Annual plants grow according to their genetic program, which can be varied to some extent by environmental and other conditions. The death of the plant is the last stage of the program.

Horticulturists can alter the duration of the individual phases, but not the basic pattern of germination, growth, development, and death. Only if they propagate the plant vegetatively, that is, by cuttings, can it achieve the immortality of such single-celled organisms as a suspension of bacteria.

3. Trees also grow according to their genetic program, but death is not a part of the program. They grow by cell division and the cells seem able to continue indefinitely. The senescence and death of the tree are due to mechanical difficulties.

The most likely cause of death is accident, such as fire or a bolt of lightning; or else some physiological imbalance among its various parts produces senescence or decay.

4. Lower forms of animal life such as insects have a genetic program with a number of stages. The final, or adult, stage is the only one in which a phenomenon that can be called aging occurs, and here the rate of living concept seems to predominate.

In other words, once the organism has reached the adult stage, the "wear and tear" of day-to-day existence, which rests both upon environmental conditions and the amount of energy expended by the organism in adapting to this environment, use up the amounts of vital substances (e.g. essential enzymes) available to it. The exhaustion of these substances
increases the inefficiency of the organism, resulting ultimately in its death. "If the cells of an animal are kept in active division, either naturally or artificially, the animal can probably live indefinitely," noted Curtis (p.118); "When the cells stop dividing, however, they develop mutations or become depleted, or both, and the animal becomes senescent." The latter process nonetheless seems to predominate over the former.

5. In mammals the somatic mutation concept seems of major importance. In the cells which undergo division continually like the blood cells, mutations may lead to cancer, while for the cells of other tissues, mutations may lead to the autoimmune diseases, or other forms of degeneration.

In this view, spontaneous mutations in the body's somatic cells proliferate over time, decreasing the cell's capacity to perform its functions. Alex Comfort (1964, p. 216) has elaborated upon this, writing that

morphogenetic processes lead to the differentiation of cells which have lost their capacity for division, such as neurones and skeletal muscle fibres, and to a suspension of division in others, and ... processes of 'wear and tear', chemical, mechanical, or of a degree of biophysical subtlety depending on the taste of the investigator, thereafter bring about the decline of some or all of the tissues thus deprived of the power of self-renewal.

However phrased, these componential changes reduce the overall efficiency of the organism, reducing particularly its ability to adapt to new demands.

To be sure, processes of autolysis, or self-destruction, set in at different rates in different parts of the organism. Adrenals, testes, the pancreas, and gastrointestinal tract mucosa autolyze relatively rapidly; the liver, kidneys, and endocrine glands have a high rate of metabolism (that is, they require large amounts of energy to maintain homeostasis); and the skin, muscle, bone, and blood vessels autolyze relatively slowly. As I. Newton Kugelmass (in Curtis, 1966, p. vii)
has observed, "the body is a walking arena of conflict among organs deteriorating at different rates." If a critical organ decays, however, and if it is not possible either to reverse the process of decay or to replace the organ, then the entire organism dies.

Artificial measures can arrest temporarily but not reverse processes of decay. Hormones can retard some aspects of senescence in human beings, as can some kinds of exercises, the insertion of spare parts to replace those worn out by internal defects or the simple ravages of time, and other chemical or mechanical procedures. But we are still far from complete divisibility and reconstitution, from perfect substitutability of vital organs, from an ability to reverse decay permanently. As Bernard L. Strehler (1962, pp. 224-225) wrote:

there is no inherent contradiction, no inherent property of cells or of metazoa which precludes their organization into perpetually functioning and self-replenishing individuals. On the other hand, the evolutionary dereliction is probably so manifold and so deeply ingrained in the physiology and biochemistry of existing forms, including man, that the abolition of the process is a practical impossibility.

The Grim Reaper still awaits man at the end of his path.

In stressing senescence, I have deliberately ignored yet another and vitally important aspect of decay in man: his personality structure. Corresponding to the body's search for physiological equilibrium or homeostasis is the personality's search for adjustment between the organism's psychophysical systems and its environment. Changes in the organism, its adjustment processes, or the external environment may lead to pathological imbalance--what we may call psychological decay. Symptomatic of this is the individual's tendency toward rationalization, compensation, or withdrawal in one or more of their many forms. Although it is clear to me that psychological decay in human systems has important analog in the development of social systems, my research to date has not focused upon this relationship.
A First Look at Decay in Social Systems

It is a great leap from such organic systems as the human being to social systems comprising two or more human beings. And, of course, social systems range in size from a marriage comprising a man and a woman, all the way to a world organization, such as the United Nations, that claims to speak for all mankind. In many respects, however, the processes affecting these diverse systems are similar. This paper will examine only a few of the many types of social systems.

The Family. A primitive type of social system is the nuclear family, that is, a man and his wife together with their children. Rising divorce rates in the twentieth century spread alarm among some analysts that the family was doomed to disappear as a basic, persistent element of society. They subsequently focused considerable attention upon decay in marital relationships, quite frequently with the end in mind of "saving marriages" or finding alternatives to divorce. Their efforts have encountered stumbling blocks. For one thing, although divorce rates can serve as crude indicators of levels and rates of marital decay, it is more difficult to find satisfactory indicators of levels of cohesion in marriages that do not fall apart. Thus the "empty shell" marriage, so aptly described by William J. Goode (1956; 1961), in which the partners maintain the forms of union despite the disintegration of any positive feelings that they may once have felt for each other, is a very real phenomenon that does not fall into the cold statistics on divorce. For another thing, legal restrictions on divorce itself and acceptable causes for divorce seem to lead to some misreporting.

Some indications of the causes of marital decay nonetheless appear clearly in discussions of divorce. The rising divorce rate in countries permitting divorce, wrote Goode (1963, p. 81), rests "upon (1) changes in the value system, (2) lessened emphasis by the circles of friends and kin on the necessity for marital stability, and (3) new alternatives to the existing marriage," such as improved possibilities for divorced women to support themselves by working. In a comprehensive survey of literature on divorce, George Levinger, (1965, p. 21) elaborated upon Goode's findings:
Attractions that act to secure a marriage derive from love and money. The rewards that spouses receive are linked to their affection for each other, to their financial income and social position, and also to the degree that husband and wife share similar characteristics. Barriers against a breakup can be coordinated to the partners' feelings of obligation to their family, to their moral values, and to external pressures exerted on them from various sources--these are the sorts of pressures that serve to maintain the boundaries of their marriage. Finally, one can consider alternate sources of affec­tional and financial rewards; these serve as a contrast to the internal attractions and have a potentially disruptive effect.

Among the sources of alternate attraction are "the other woman" (or man) as a preferred sex partner, "in-law troubles" and other disjunctive kin affiliations (cf. Ackerman, 1964), and community demands (cf. Farber, 1964), opposing religious affiliations, and the wife's opportunity for independent income. Goal-directed activities (Spiegel, 1957), joint problem-solving (Vogel and Bell, 1960; Davis, 1949), and symbolic interaction such as rituals (Bossard and Boll, 1950), and family myths (Ferreira, 1963) may enhance solidarity if the partners share a basic desire to maintain the stability of the marriage. Below the threshold of positive predispositions, however, such activities may exacerbate rather than ameliorate existing stress, contributing ultimately to the decay of the marital system.

The concluding note in our discussion of decay in the family comes from Talcott Parsons (1955, p. 9). He related rising divorce rates in western societies to a more general process of differentiation that seems to be reducing the importance of kinship units in our society. The trend in American family life, he concluded, has resulted in the transfer of a variety of functions from the nuclear family to other structures of the society, notably the occupationally organized sectors of it. This means that the family has become
a more specialized agency than before, probably more specialized than it has been in any previously known society. This represents a decline of certain features which traditionally have been associated with families; but whether it represents a "decline of the family" in a more general sense is another matter; we think not.

Parsons foresaw "the beginning of the relative stabilization of a new type of family structure, in a new relation to a general social structure, one in which the family is more specialized than before, but not in any general sense less important, because the society is dependent more exclusively on it for the performance of certain of its vital functions"

Social Movements and Organizations. Two aspects of voluntary systems such as social movements and organizations merit special attention here. The first is the simple question of what becomes of them. Some, of course, particularly revolutionary movements or those which established authorities perceive as threatening to their own position, may encounter less or more severe forms of suppression. One consequence of this might be the extinction of the group, as occurred with many anarchist groups around the turn of this century. Alternatively, the movement may successfully overthrow the existing government, as did the Bolsheviks in the Russia of 1917. Or the group may modify its goals and procedures, that is, adapt to the expectations of the powerful in the existing political system; very roughly this pattern characterized the development of the German Social Democrats from an underground movement ostensibly hunted by the police to a workingclass party competing for power within the framework of the political system.

Other such organizations suffer from their own success. What does the future hold for an ad hoc pressure group, formed to encourage the adoption of a specific item of legislation, after the national legislature has enacted the laws it sought? When the United
States entered World II, for instance, did the "Committee to Defend America by Aiding the Allies" any longer have a function? And what should the National Foundation for Infantile Paralysis, sponsor of the annual March of Dimes fund raising campaign, have done after the development by Jonas Salk of an effective vaccine? In the former instance, the group effectively disbanded, submerging their own activities in the more general American war effort. In the latter, the organization sought and found a new goal which its organizational and fundraising talents could serve (Sills, 1957).

Still others are not quite so fortunate. Political parties, such as the Progressives during the first quarter of this century, sometimes fail to gain widespread popular support. Or cataclysmic sects, centered around a belief that the end of the world is approaching, encounter organizational difficulties and credibility gaps after the world does not in fact end at the appointed hour (Festinger, Riecken and Schachter, 1956). In such cases, the organizations may opt to persist, despite declining support; adopt a new set of perceptions and policies; disband; pursue their goals through extra-organizational procedures; or follow some other strategy.

An organization caught dramatically between success and failure was the Woman's Christian Temperance Union. The WCTU contributed significantly to the temperance movement that culminated in the enactment of a constitutional amendment prohibiting the production or sale of alcoholic beverages. But neither the WCTU nor the 18th Amendment significantly changed America's drinking habits. Ultimately, the latter was repealed and the former at least in part discredited. But, as Joseph R. Gusfield (1955, p. 232) has pointed out:

Contrary to the expectations of theories of institutionalization, the movement has not acted to preserve organizational values at the expense of past doctrine.
In adhering to less popular positions, it has played the role of the sect and widened the gap between WCTU membership and middle-class respectability. ... [In this way] the split within American Protestant middle classes has been widened.

The WCTU instituted substantial organizational changes, particularly in the composition of its leadership, in choosing ideological purity over adaptation to a societal environment that liked a drink now and then. This decision gained the organization members, at least until 1951, but lost for it much of its former or potential influence over public policy.

The second aspect of particular importance here concerns the membership of such social movements and organizations. In what circumstances will individuals defect from social systems demanding some level of personal commitment? Gabriel A. Almond (1954, p. 300), in his study of former members of the American, British, French, and Italian Communist parties, found dissatisfaction stemming mainly from cross-pressures of five types—between the demands of party membership, on the one hand, and, on the other, the defectors' careers, personality structures and relationships, loyalties to other groups, value structures, and moral standards. Almond continued (p. 331):

defection can be best understood as a process extending over time and involving a whole sequence of decisions. The process of defection is affected by the characteristics and expectations of the individual, the aspects of the party to which he has been exposed, the degree of his commitment and involvement in the party, and the opportunities available to him in the outside world.

The more difficult re-entry into the outside world is—because of opprobrium attached to party membership, because of bridges burned by individuals in the past,
because of the intensity of emotional and intellectual commitments—the less likely it is that the individual will defect.

Summarizing the dynamics of disaffection from a number of social movements, Hans Toch (1965, p. 173) wrote that precipitating events can act as catalysts to defection, provided membership is sufficiently tenuous to be sacrificed. If a person has latent reservations, these can sometimes be mobilized. If the process of becoming a member is still in its preliminary stages, the sequence may prematurely terminate during times of stress. And although a less than fully committed member (if he has no alternative to his faith) may temporarily patch up his beliefs, the seeds of doubt will tend to germinate: the next juncture at which beliefs are tested may find the same person more vulnerable.

The fully committed member, on the other hand, has a variety of options, each of which helps him to neutralize invalidating experiences. It is only because different members can exercise different options that social movements may be weakened, split, or even destroyed despite the fact that individual members have retained their faith. . . .

"At best," concluded Toch, "social movements tend to survive such crisis situations with their ideologies considerably changed."

**Business Organizations** A note should be added on another type of special purpose system: the business concern. Perhaps in no other type of system discussed in this paper is the need for innovation more manifestly apparent (Burns and Stalker, 1961). In good times, the business firm in a freely competitive system must be responsive to its environment if it is to grow or even to keep pace in the changing world. This environment includes changes in competition from other firms, public
tastes, technologies for making production more efficient, decreased demand for certain old products (e.g. horse-collars) and increased demand for new products (e.g. electronic components for transistor radios), accepted principles of marketing and advertising, and so forth.

In bad times—that is, when a depression is pushing the entire economy toward a new equilibrium position—the pressure for innovation is even greater. As Joseph A. Schumpeter (1934/1961, p. 242) pointed out,

The old businesses . . . are faced by three possibilities: to decay if they are unadaptable for objective or personal reasons; to take in sail and try to survive in a more modest position; finally, with their own resources or with outside help either to change to another industry or to adopt other technical or commercial methods which amount to extending production at lower cost per unit.

In this sense business concerns are not dissimilar from the social movements and organizations discussed above. The monetary standards for entrepreneurial success and improved methods of cost-accounting, however, make innovation or the lack of it more quickly felt in business firms.

But where does innovation come from? Victor A. Thompson (1969, p. 46) has argued that "invention cannot be understood in terms of economic rationality" but rather in terms of what he calls "slack": "an objective-subjective condition in which the subjectively set aspiration level has been exceeded by the objective achievement, the excess creating a relaxed, indulgent decision-making situation." Production, he wrote,

takes advantage of existing information, but development (and even more, exploratory or basic research) involves a good deal of new learning. . . . R and D activities, therefore, need an open intellectual structuring. Production efficiency can be very costly in R and D.
Research and development are, of course, uncertain ventures. "Programmed or determined behavior prevents the optimum exploitation of this uncertainty," Thompson noted (p. 47); "What is needed is flexibility, pluralism, multiple approaches." In short, what Thompson was calling for is what communication engineers call "redundancy" (defined broadly by Colin Cherry [1957/1961, p. 305] as "a property given to a source by a virtue of an excess of rules (syntax) whereby it becomes increasingly likely that mistakes in reception will be avoided"). The slack provided by an open intellectual framework of inquiry seems to overdetermine the probability of innovation in a business firm—a condition that Thompson and others (cf. Landau, 1969) would introduce into modern public administration.

Large-Scale Political Communities. A political community is a more or less exclusive social group occupying a territory, and possessing both a sense of community as well as a set of patterns or institutions aimed at attaining the community's goal and adapting its procedures and goals to its dynamic environment. Such political communities are usually general-purpose systems, taking the form of ward committees, towns and cities, nation-states, empires, and, conceivably at least, a world community. These communities at different levels may comprise a nested system, with "multiple loyalties" (Guetzkow, 1955) characterizing the population's sense of community. In this view the municipal government is that set of institutions and patterns responsible for political processes in the municipality; a superordinate national government may in part share this function, but more generally has a much larger scope.

Edward Gibbon, in his justly famed study (1776-1788/1932), discovered four main causes for the "decline and fall" of the Roman Empire: "The principal of these is 'immoderate greatness'; the others are wealth and luxury, the deluge of barbarians, and the spread of Christianity" (Lossky, 1966, p. 26). In addition there was a plethora
of minor "causes," such as the personalities of the emperors, excess taxation, the licentious praetorian guards, and so forth. Gibbon's brilliant if frequently wrongheaded analysis stimulated a chain of thinkers that continues today to study the disintegration of empires.

The most systematic of these stemmed from a research team organized by Richard W. Van Wagenen at Princeton University's Center for Research on World Political Institutions. In their preliminary report, Karl W. Deutsch and his associates (1957; cf. Kann, 1957; Lindgren, 1959; Deutsch et al., forthcoming) focused upon the integration and disintegration of political communities in the light of historical experience. They first distinguished between an amalgamated and a pluralistic "security-community," that is, a group of people integrated in the sense that it has attained, "within a territory, . . . a 'sense of community' and . . . institutions and practices strong enough and widespread enough to assure, for a 'long' time, dependable expectations of 'peaceful change' among its population" (p.5). Then, after looking at some three dozen cases of integration or disintegration and examining ten of these in detail, they derived fourteen general principles grouped into three categories. First were two conditions essential for both pluralistic and amalgamated security-communities: the compatibility of major values and mutual responsiveness. Next, some eight conditions appeared to be helpful for pluralistic, but essential for amalgamated, security-communities: a distinctive way of life, the existence of core areas with certain capabilities, superior economic growth, an expectation of joint economic reward, a wide range of mutual transactions, a broadening of the elites, links of social communication, and the mobility of persons. Finally, some conditions were helpful but nonessential for both pluralistic and amalgamated security-communities: a reluctance to wage "fratricidal" war, an outside military threat, strong economic ties, and ethnic and linguistic assimilation.

Of particular interest here is their discussion of background conditions conducive to disintegration, based upon the breakup of the American Union in the mid-19th century,
the union between Ireland and the United Kingdom in 1921, the union of Norway and Sweden in 1905, and the final dissolution of the Habsburg Empire in 1913 (Deutsch et al., 1957, pp. 59-65). One set of conditions "tended to destroy amalgamated security-communities by placing excessive burdens upon them." Among these, perhaps the most obvious was the effect of excessive military commitments, particularly when they brought the constituent populations "no conspicuous gains in prestige or privileges," but only the strains of participation in long or otherwise debilitating wars. Similarly, political mobilization on the periphery, together with increased ethnic or linguistic differentiation, added to the normal burdens of government. "Such a substantial increase in political participation meant in each case that the needs, wishes, and pressures of additional social strata or regions had to be accommodated within an old system of political decision-making that might be--and often was--ill-suited to respond to them adequately and in time" (p.61).

A second set of conditions tended "to weaken or destroy amalgamated security-communities by reducing the capabilities of their governments and political elites for adequate and timely action or response." These included economic decline or stagnation (particularly, relative to the growth of neighboring communities), low upward social mobility and especially the "relative closure of the established political elite," and excessive delays of demanded and expected social, economic, or political reforms. "Another aspect of the same complex of factors was the disintegrative result of any major failure on the part of a formerly strong or privileged state, group, or region to adjust psychologically and politically to its loss of dominance as a result of changed conditions" (p. 64). Thus, for instance, the growing rigidity of Austro-German and Magyar political leaders, who felt threatened by the increasing social mobilization of other ethnic groups within the Habsburg monarchy and by their demands for political equality, contributed greatly to the ultimate disintegration of that empire.

An equally significant effort to analyze systematically the breakdown of large-scale political communities is S.N. Eisenstadt's study (1963; cf. Eisenstadt, 1967) of
historical bureaucratic empires. In his view, the most important conditions giving rise to the institutionalization of these political systems are "(1) the tendency of the rulers toward implementing autonomous political goals; and (2) the development of certain (even if relatively limited) levels of differentiation and free-floating resources in all the major institutional spheres of the society" (p. 361). Contradictions between "the policies of the rulers" and "the orientations, goals, and political activities of the principal strata" produced "the primary problems and strains in the political structure of the empires." These in turn generated processes of change which could threaten the very viability of the system. To some extent the rulers and the principal strata could accommodate such change (p. 363). In other cases, however,

the contradictions in the respective orientations and activities of the rulers and the major strata, and in their interrelations, became so strong that they undermined the basic conditions and premises of the historical bureaucratic polities. This resulted in processes of transformation of the political system--i.e., processes of total change--in the direction of less differentiated and flexible political systems. The different specific political and administrative organs of these polities were not able to perform their functions of interrelating the political sphere with other social spheres and of insuring the mutual flow of resources among them. One crucial aspect of such a breakdown of this interchange was the tendency of the bureaucracy itself to displace its service goals to the rulers and to major strata--emphasizing goals of self-aggrandizement, and thus seriously impairing its own efficiency.
Sometimes this resulted in the emergence of what Eisenstadt called "pre-bureaucratic" polities, as happened after the decay of the Byzantine and Ottoman empires. Elsewhere and particularly in Western Europe, more differentiated political systems replaced the decaying empires.

**A Second Look at Decay in Social Systems**

This brief review of research findings on decay in social systems points to a need both to re-examine the nature of the concept itself and to reconsider some of its characteristics.

**Three Bases of Decay** Growth and decay as social processes center on three main aspects of the systems in which they occur. First are the system's basic resources, or what Harold D. Lasswell and Abraham Kaplan (1950, p. 83) call base values. In this regard growth means increments, and decay decrements, in the system's base values—changes that are, in principle at least, measureable. Thus a system decays if its power (participation in decisions involving severe sanctions) declines; if its wealth is diminished through losses of territory or population or the depletion of important natural resources; if it suffers a loss of prestige in its environment; if debilitating disease or malnutrition stalk the land, damaging the well-being of the population; if its skilled manpower, forced perhaps by a war or the destruction of capital equipment to turn to tasks for which it is not trained, loses its skills; if its reputation for righteousness declines; if other actors in the environment lose their affection for the system; if its libraries, data banks, or other institutions for enlightenment suffer setbacks.

These base values have both their relative and absolute aspects. It generally makes little sense to ask how powerful an actor is (cf. Dahl, 1957; Harsanyi, 1962). More meaningful is the question of how much power the actor has with regard to whom, in what respects, and what the cost of exercising it would be. Similarly, if we are interested in an actor's wealth, our questions usually seek to find
how wealthy he is relative to other actors in the larger system of which he is a part. And yet each value doubtless has a threshold below which an actor is incapable of acting. Unless an individual has at least a modicum of physical strength, wealth, enlightenment, well-being, and so forth, he would not even be able to get up in the morning and engage in any meaningful activity.

Second are the system's goals or scope values (Lasswell and Kaplan, 1950, p. 87). An actor in a system (or system in a supersystem) makes certain demands upon the system—again, in terms of absolute or relative amounts of power, prestige, wealth, and the like. Selecting appropriate goals rests upon an accurate assessment of the actor's capabilities in terms of base values, the thresholds above which his goals cannot be realized, and the desirability of the goals in the first place. The persistent formulation and pursuit of a set of goals that are highly salient to the actor but have a low probability of realization will in all likelihood lead to systemic frustration. Thus Adolf Hitler and his Third Reich, in an attempt to subjugate a major portion of the world, aroused opposition that made his dreams as futile as they ultimately proved disastrous. It is true, of course, that setting the sights high may also unleash potential for growth—Toynbee's response to a challenge. But there seems to be a threshold beyond which no actor in a system can go. And many a Samson has pulled his house down upon himself because of a failure to recognize what these upper limits are.

It may also be that an apparently desirable goal is found to be not so desirable after its accomplishment. (The joys of anticipation, some say, are greater than the joys of realization.) Thus the Spartans had to transform their entire social system into a garrison state to keep their conquered Helots in check. And the consequences for the United States might be equally disastrous were it to fight China, as some have urged, and actually defeat that
large country. In this sense, too, growth is improved reality-testing in the setting of goals. Decay, by the same token, is a persistent failure to pursue goals at once capable of realization and which, if achieved, would contribute to the effective functioning of the actor without major changes in its structure.

Third, decay may take the form of decreased combinatorial resourcefulness. Perhaps few systems utilize their resources to the fullest extent possible in the pursuit of their goals. "Satisficing" may well be the nature of man and social systems alike (Simon, 1957); alternatively, it may simply be that the system maximizes goals other than those attributed to it by outside observers. Again, however, there are thresholds. The inability to devise strategies for utilizing base values in the pursuit of scope values is deleterious to the extent that it hampers the effective functioning of the actor. That is, there is a threshold below which ineffective steering ceases to be merely non-maximizing, and becomes dysfunctional for the system as a whole.

**Systemic Functions** Viewed from a slightly different perspective, a system performs functions vis-a-vis both its components and its environment. In the first instance it seeks to maintain a dynamic equilibrium, that is, homeostasis. For social systems this means the maintenance of a distribution of valued resources acceptable to the population comprising the system. This in turn necessitates a determination of what values exist, what demands are made for their distribution, what schemes of distribution are feasible, and which of these are most likely to generate sufficient support among the population to permit the continuity of the system as a system. With Talcott Parsons (e.g. 1966) we can specify four aspects of this overall equilibrating function: the determination of patterns of organization; the maintenance of solidarity among the components of the system; the attainment of the system's goals within its environment; and the adaptation of the system to its environment.

The system also acts as an organism that transforms stimuli from the external environment into responses that
in turn affect that environment. In a sense, of course, Parsons' goal-attaining and adaptive subsystems perform this transformation function. If our focus is on interaction among systems, however, as is the case in this paper at least in part, then it makes sense to differentiate between the within-system and inter-system functions. Performance of the transformation function rests upon the type and magnitude of the external stimuli, the values or resources inherent in the system, and the organization of the system. Thus, in the face of wind resistance and friction, an internal-combustion motor transforms gasoline and air into energy that propels the automobile forward or backward in space. A foreign-policy making agency transforms information about the outside world, such as messages from a foreign government, into policies calling for behavior ranging from inaction to the dispatch of messages to foreign governments, all the way to the initiation of warfare.

Decay in the functioning of a system may mean (a) a loss of homeostasis, (b) the retention of homeostasis, but at a lower level of activity (that is, reduced base values for the population), or (c) decreased autonomy vis-a-vis other actors in the system. The detection of functional growth and decay is nonetheless fraught with problems. A mere increase in base values could conceivably compound the tasks of decision makers—that is, it may be disequilibrating in the long run. Similarly, homeostasis may be misleading to the extent that new groups are emerging within the population to make demands upon the system as a whole. Finally, increases in a system's ability to perform some functions need not imply commensurate increases in its ability to perform others. In all these senses, dynamic homeostasis is an overall result—and, I have argued, it is important to develop indicators that can detect growth or decay in a system's ability to maintain dynamic homeostasis.

Some Cross-Level Generalizations Even at the present, pre-theoretic stage of my research on decay in social systems, certain cross-level generalizations emerge. The
first of these is that decay in social systems, like growth, is a variety of social change. In some living systems, such as annual plants and even lower forms of animal life, decay and death are part of a genetic program. The engineer with sufficient information about the characteristics of a mechanistic system's components can predict when malfunctioning will occur. In social systems, the inevitability of decay is far from certain (cf. Sorokin, 1947, pp. 528-534). Miller (1965c, p. 378), answering his own question about whether human societies decline through senescence to their ultimate termination, wrote:

Perhaps a few have, and all their citizens have died out. Much more often, however, just as a new management reorganizes the employees of a bankrupt firm into a new company, with the fall of a nation or government, one or more new regimes employ an old or new template or charter to reorganize the components of the last society into a new system, or perhaps more than one.

The death of one of the partners will, of course, terminate a specific marital system. But the remaining partner can enter into a new marital system simply by finding another spouse. Still less are larger social systems, such as cities and nation-states, tied to specific individuals. Such systems comprise roles, which a succession of individuals can fill over time. Given this degree of substitutability, there is no reason inherent in the systems themselves why they must decay and die. Social systems of roles that are not specific to certain individuals, in other words, do not have genetic programs that include decay.

Decay may proceed unevenly through a system. It may be quite possible for a system to cope effectively with its environment despite decreasing solidarity within the system itself. Alternatively, the growing size and complexity of its organizational patterns may be conducive to increasing rigidity in responding to the demands
of its components. It is conceivable, moreover, particu-
larly in social systems, that one component may be growing
at the same time but independently of the fact that another
component in the same system is decaying. In a mechanistic
system with replaceable parts, uneven decay creates a de-
mand for continual maintenance to keep it functioning prop-
erly. (There appear to be few analogs of the famed "one-
hoss shay" in the real world of machines.) In organic and
social systems, an extensive change in one set of components
that is out of synchronization with other shifts may well
shake the stability of the entire system (cf. Johnson, 1966,
pp. 55-58). And, of course, the sheer quantity of change
may overload a system's decision-making capabilities (Vickers,
1959).

Not all components are equally important in maint-
aining the stability of the system. The removal of a
person's appendix normally does not cost him his life.
Similarly, liver cells can multiply more rapidly to fill
the gap should it be necessary to remove a part of the
organ surgically. But, until such time as artificial
hearts are perfected, man needs his own in good working
order. The importance of components fulfilling specific
functions decreases to the extent that other components
can fulfill the same functions (redundancy). If only one
set of institutions performs a vital function in a social
system--for example, maintaining solidarity among the com-
ponents--then the system cannot be stronger than that par-
ticular set of institutions. If, however, the system pro-
vides other means by which the particular goal can be
served, then a breakdown of one set of institutions need
not mean disaster for the system as a whole. Too much
functional diffusion can lead to losses in efficiency, to
be sure, but an overly large amount of functional specifi-
city can place too much weight on the importance of single
components.

Similarly, decay (as growth) may be reversible. That
a system has begun to decay does not necessarily mean that
progress toward total decay is inexorable. The reversibi-
licity of decay is clearest in mechanistic systems and least
likely in organic systems. In social systems the possibility exists either to shift resources to terminate decadence or to substitute new goals in the place of old ones to revitalize the system. The reversal of processes of decay places great stress upon the system's innovative capacity, no less than upon the willingness of its population to take risks and to accept change.

Finally, to speak of decay as a process that leads to total extinction is misleading. Miller's example (1965a, p. 196) of watching an ice statue melt in the hot sun is an extreme example of entropy. Social systems may disaggregate into their component parts, as did the Austro-Hungarian Empire; or they may reorganize themselves with more modest expectations in terms of goals, or with reduced demands on the environment, as seems to have been the case with postwar Britain. Miller (1965b, p. 407) notes generally that "if a system's negative feedback discontinues and is not restored by that system or by another on which it becomes parasitic or symbiotic, it decomposes into multiple components and its suprasystem assumes control of them." In social systems, however, the capabilities of the system may be reduced to a level incommensurate with what is needed to maintain the system at its current level of output (both vis-a-vis other systems and components within the system). When this happens, the system may simply transform itself to a lower-level system in terms of goals and strategic activity, with the possibility existing that through internal adjustments (e.g. the demands of a population) it can adapt to its new position within the environment.

All these tentative generalizations point to the increasingly important task of looking more closely at transformation conditions in social systems. And, when we are examining a social system in the process of decay, then what becomes crucial is the identification of a "threshold of no return," below which is either decomposition or reorganization at reduced levels of activity.
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It is commonplace that yesterday's solutions are applied to the problems of today, and that solutions appropriate today will be applied inappropriately tomorrow. While this cliche of the cynic is less than universally applicable, supporting evidence is frequently enough seen to alarm the concerned and concern the tranquil.

The inertia of response to economic phenomena is evident often to warrant its examination with an "irrational passion for dispassionate rationality."

Ecological disturbances are, with increasing frequency associated with lagged responses (or lack of response) to economic problems, as exemplified by the difficulties of those shore birds still resident in Southern California, and by the human residents of that area who have, for one reason or another, an inclination to breathe.

But the bounds of human ecology extend far beyond intrusions upon the state of natural resources. They encompass as well the networks of interrelationships among the vast range of human activities and institutions which together permit a stable society. It is the purpose of this paper to examine the system of economic institutions (that is, patterns of activity, habits of thought, accepted arrangements) with an eye to minimizing ecological disruption to homo sapiens.

The notion of an economic structure which serves a constraining role on human activity, is far from new. For example, the Social Darwinists of the Nineteenth Century contended that certain natural laws served to maintain society's potential for economic expansion. Additionally, they argued, those laws allocated both decision-making authority and the financial rewards associated with it, in such a fashion as to maximize the gains of society.

As one examines the role of economic institutions it becomes increasingly evident that any useful study of the matter must focus upon change -- not in the quantitative
sense, but in terms of the processes by which change is engendered. Particularly it must focus upon the changes in those institutions which are in turn constraints upon a wide range of economic behavior. The Social Darwinists asserted they had grasped the very nature of economic change, and had discovered it at one not only with the increasingly accepted notion of 'evolution', but with Darwin's perceptions of natural selection as well. Thus their views merit some examination as a starting point for considering the process of social and economic change.

The Social Darwinists, as exemplified by Herbert Spencer and William Graham Sumner, held that individuals most effectively exploiting the opportunities for their own advancement, exhibit traits identifiable as survival characteristics in economic (or financial) terms. The successes of these individuals, they held further, evidence both their contributions to society and the merit of their financial gains. Conversely, they asserted, those whose poor adaptation to the social-economic order is evidenced by their low incomes and minimal access to the tangible products of society, demonstrate both their unworthiness for higher incomes, and the minimal nature of their social contributions.

The broad conclusions of the Social Darwinists were that the income distribution of the day was appropriate (indeed, axiomatically so), that it was inappropriate and morally wrong to give assistance to the poor or otherwise alter the income distribution, and that optimum economic progress was assured by maintenance of the established economic relationships. The latter point is of especial significance. A doctrine purportedly based on change (it is difficult to consider "Darwinism" otherwise) emerges as a defense of the status quo.

The reason for the turnabout is simple. An evaluative device, used for establishing the merits of various economic consequences, is applied not to the entire system, but only to its most recent consequences, and then is used to validify those consequences. It is feedback, in a system of n stages, applied no further back than stage n-1.
Thus Social Darwinism deals not with change, but with statics. The really useful questions are thus ignored: What path was followed in the evolution of the institutions whose consequences are under investigation? Is a projection of these institutions plausible? What later variables are introduced, and what distant (and hence less visible) changes emerge in the system of economic institutions? These questions relate to routing feedback to early stages of the system -- one of the characteristics of a study directed at the nature of change.

Static analysis is economics can be useful as a device for sorting out relevant variables and for establishing, as a first approximation, their relationships. With these chores accomplished, the economist may then seek a closer approximation of reality by building into his model the time-related variables. But an analysis which stops short after the preliminary static study is, generally speaking, an exercise in futility. Its especial problem is that, since it assumes constant those parameters varying with time, it precludes the analysis of all but trivial problems.

Much of the history of economic analysis relates to static, culture-invariate study. In each of a number of successive generations, have taken its technology, its culture, its habits of thought as objective reality, in terms of which problems were to be discussed and explained. Successive generations have modified conclusions of earlier ones, but with surprisingly few exceptions have failed to make concerted efforts at generalizing their conclusions temporally.

Thus the rigid constraints of the Social Darwinist system, and its failure to allow for significant feedback in an on-going process, are perhaps not surprising. The major premise of the Social Darwinists is that a market system exists in which resources are supplied and goods allocated in accordance with a predictably operating pricing mechanism. The minor premises are (a) that precisely such a market system is ideal and should therefore be preserved, and/or (b) that the consequences of such a market
system are ideal. The Social Darwinists offer no defense of either minor premise but, rather, implicitly assert that (b) is true because (a) is true, and that since (b) is true, (a) must be true.

This example of the Social Darwinists and the market system is especially useful in view of the frequent assumption in economic analysis, that such a market system and its consequences are invariates, and that remaining economic phenomena must be responsive to them.

If, in a contemporary context, the responding phenomena include the water-borne oil resources of Santa Barbara and the airborne chemical resources of Los Angeles; if they include the allocation of food among the residents of the United States, and the allocation of resources to the medical needs of the country; if they include the host of problems of human ecology, then the assumptions preceding analysis must be reduced to the minimum. Importantly, the institutional arrangements of the economy must be viewed as variables.

A useful approach to such realistic appraisal of the variables to be dealt with, is that of John R. Commons, one of several prominent "institutional" or "evolutionary" economists. His relevant publications appeared in the first third of this century.

For Commons the glue that holds economic society together is not the self-interest which earlier economists (and the Social Darwinists) saw as the outstanding fact of the market society. Rather it was collective action, the customary behavior expected in the social economy. "Custom and habitual assumptions are the underlying principles of all human relations," he asserted, adding, "...they go to a fundamental and ultimate principle without which men cannot live in society -- the principle of Security of Expectations." 2 We continue as members of concerns already going, so that conformity to repeated and duplicated practices ... is the only way to obtain life, liberty, and property with ease, safety, and consent.... We start and continue by repetition, routine, monotony -- in short, by custom." 3
Human ecology and evolutionary economics

Commons' man, a creature of habit, is in sharp contrast to the economic man seen by Adam Smith and his fellow classical economists. Smith's man (of his Wealth of Nations) was one who constantly sought his own interests, and only inadvertently brought benefits to those about him. The neoclassicists' economic man fit the same mold and in addition was constantly engaged in maximizing his pleasures and minimizing displeasures. (Kenneth Boulding recently suggested, "No man in his senses would want his daughter to marry an economic man." 4

Another institutional economist, Thorstein Veblen, embalmed the neoclassical version of man thus:

The hedonistic conception of man is that of a lightning calculator of pleasures and pains, who oscillates like a homogeneous globule of desire of happiness under the impulse of stimuli that shift him about the area, but leave him intact. He has neither antecedent nor consequent. He is an isolated, definitive human datum, in stable equilibrium except for the buffets of the impinging forces that displace him in one direction or another. Self-imposed in elemental space, he spins symmetrically about his own spiritual axis until the parallelogram of forces bears down upon him, whereupon he follows the line of the resultant. When the force of the impact is spent, he comes to rest, a self-contained globule of desire as before. 5

Commons' customary collective action is a "binding force ... which unites individual to individual and industry to industry." 6 But customs themselves change, and it is in these changes that he finds the clues to the evolving economy. The motive force consists in the conflicts of interest which engender change and are in turn created by it. External phenomena such as technology, are seen as contributing to the process.
With such a complex of economic change, and with inherently unmeasurable variables, it might seem that there is no basis for empirical analysis in Commons' system. But he gained a firm grip on the realities of the institutional basis of change, by closely examining the device by which new economic arrangements are formally noted in our society: the law. As economic institutions evolve, legislation emerges to encourage certain economic behavior and to discourage or prevent alternative behavior. And court-made law responds with an even finer sensitivity to the emerging economic arrangements and habits of thought.

The role of the courts is exemplified in the changing meaning of property. The Fifth Amendment to the U.S. Constitution specifies that no person "shall be ... deprived [by the Federal Government] of life, liberty, or property without due process of law." The Fourteenth Amendment echoes this protection against infringement by the States. It was in dealing with these provisions that the Supreme Court found it necessary, in several cases of interest, to address itself to the meaning of "property."

The first of these cases came in 1872, when a group of New Orleans butchers sued the state because a new Louisiana law had driven them out of business. The law had given a monopoly in the slaughter house business of their city to a competitor. The litigants contended that the law, while leaving them with all their equipment and buildings, deprived them of property in contravention of the Fourteenth Amendment. Their livelihood itself, they asserted, was property and thus was protected.

To put the matter directly, it was the expectation of income for which they claimed property rights. The Court ruled against this argument. 7 Twelve years later in a parallel case 8 a majority ruled similarly, but a single Justice asserted in his concurring opinion that a man's calling was indeed property protectable under the Fourteenth Amendment. In behalf of this position he cited Adam Smith: "The property which every man has in his own labor, so it is the most sacred and inviolable." 9
Of this Commons comments, "Thus the new meanings of property and liberty were found in Adam Smith and the customs of business, and not in the Constitution of the United States." 10

A majority of the Court came to this view in 1890, in a case seeking to prevent a state legislature from establishing railroad tariffs in a fashion which would prevent appeal to the courts. 11 From this point on, the expected earning power of persons or things, was viewed at law as property itself. Thus "Property in the usage of the old common law... meant any tangible thing owned. Property, in the later decisions, means any of the expected activities implied... in... acquiring, using, and disposing of the thing. One is Property, the other is Business." 12

Thus did the courts accommodate the official view of economic behavior to the practices through which the economic actors (businessmen, in this case) play their roles. By 1890 the economy was heavily affected by the notion of value as a bundle of expectations.

This was part of what Commons called "the principle of futurity" which he described as a "connecting link between law, ethics, psychology, and economics." 13 His "genetic study of the role of courts and the law in determining the course of economic activity" 14 was thus an effort to view together these facets. One commentator notes,

In Commons' view the classical economists, with their mechanistic bias, and the neo-classicists, with their subjectivistic bias, had overemphasized the significance of commodities and feelings, and had failed to provide the heuristic devices necessary for the study of concrete economic culture. To avoid the unrealistic results of the orthodox economists' analyses, Commons took as his starting point the study of actual cultural relations, the "transactions" or "working rules" of the economic order. 15
It is worthwhile to mention a further class of cases which were later to turn on the Court's interpretation of property. Social legislation reportedly was struck down on the grounds that establishing minimum wages, maximum hours, and other conditions of work, violated the right of contract not only of employers, but of employees as well. The Court found this right to contract was protected by the Fifth and Fourteenth Amendments: contract is the expectation of income, and this is property. 16

All these actions of the Court involved an implied set of priorities of social values. While the conventional pose of the Court is that of a bystander to the social process, its decisions of necessity reinforce some social patterns of conduct and repress others. In this mix are established the Court's social priorities.

The cases selected for discussion here are of course a minute portion of the Court's activities in affecting and reflecting patterns of economic activity. But they illustrate the larger issue involved: the law is a non-negligible part of the network of institutions involved in the ongoing development of human conduct. And these cases show the law as a useful indicator of changes occurring outside the courts.

Additionally the law may be bent to accommodate those institutions which are carefully nurtured misperceptions of the economic structure. Thurman Arnold illustrates this in his discussion of the law of corporate bankruptcy and receivership. In various ways the supposition is maintained both in law and in the popular view, that a corporation in its economic activities resembles (some would say "is") a person. When a corporation in financial difficulty is unable to meet its debts, the law deals with in under the pretense that it is indeed a person: the court invokes "the humanitarian view that the debtor who had surrendered all his property had sufficiently atoned for his sins to be allowed to start over again." 17
But much of the value of a corporation is in the nature of expected income rather than tangible assets. This expected ("going-concern") value can be realized only if the "errant" corporation is maintained in business. Thus, requiring it to surrender its tangible assets may well be a disservice to the creditors.

Against this background the courts and legislatures have evolved a system of "corporate reorganization," in which it is pretended that the insolvent firm relinquishes its property to creditors, while in fact the firm is kept intact but made to look like a different company.

Of this Arnold says:

A corporate reorganization is a combination of a municipal election, a historical pageant, an anti-vice crusade, a graduate-school seminar, a judicial proceeding, and a series of horse trades, all rolled into one -- thoroughly buttered with learning and frosted with distinguished names. Here the union of law and economics is celebrated by one of the wildest ideological orgies in intellectual history.\(^{18}\)

The ritual of corporate reorganization is interesting here as an example of the responsiveness of the law to the practical problem of catering to the popular understanding (or misunderstanding) of an economic problem, while at the same time dealing constructively with the issue at hand.\(^{19}\)

The social sciences and particularly economics are often taken to be disciplines whose highest form is that of rigorous analysis of quantified data. But as evolutionary economists such as Commons have demonstrated, an intimate understanding of the on-going social economy may be gained only through a similar understanding of economic institutions.

In sum, then, evolutionary economists offer these understandings:
First, the social-economic structure undergoes continuing change.

Second, the sources of this change are in part technological and in part attitudinal, the latter both creating and responding to legal-economic arrangements.

Third, this change is an on-going process, whose directions are not predictable over the long span of time; and

Fourth, the study of economics becomes trivial if these variables are assumed constant or are assumed to bear a predictable relationship.

One conclusion emerges from even the most casual observation from the vantage point of evolutionary economics: the difficulty -- some would say the impossibility -- of detecting any deliberate system of priorities in the allocation of resources in the United States, over the span of years. If priorities are to be set, this school of economics is prepared to contribute an understanding of economic change useful to the endeavor.
NOTES

1. By "model" the economist means an abstraction intended to correspond to reality; this inverts the use of the term in some other disciplines.


3. ibid., p. 45


7. Slaughter-House Cases, 16 Wall. 36

8. Butchers' Union vs. Crescent City Co., Ill U.S. 746


12. Commons, op. cit. p. 18


15. ibid. p. 153

16. In one of these cases, Lochner vs. New York (1905) the Court decided that a limit of ten hours a day and sixty hours a week for New York bakers unconstitutionally interfered with the right of employees to contract. Mr. Justice Holmes in his dissent retorted: "This case is decided upon an economic theory which a large part of the country does not entertain... The Fourteenth Amendment does not enact Mr. Herbert Spencer's Social Statics." (198 U.S. 45, 75-76)


18. ibid. p. 230

19. Arnold expresses a less sanguine view, arguing that the potential financial gains of the process are typically absorbed by the attorneys involved.
A TRANSACTIONAL APPROACH TO ENVIRONMENTAL PLANNING

CHARLES R. DECHERT

Environmental planning is the process of projecting into the future conceptually and/or imaginatively the elements of an ecological system in their inter-relations. The elements of an ecological system are themselves real systems. Some of these are concrete systems, such as the men, trees or houses in a community. Some are relational systems involving the order in an organized assembly of elements. Functional systems belong to this category, for example, the political system in a community - or a weather system. The concept ecological system emphasizes things and/or events in a context. Only if such relations are referred to real entities, however, can they have dynamism or meaning in time - since relations do not subsist, exist in themselves.

The ecological system as a relational web may be analyzed in terms of the inputs and outputs that link its various concrete components. These components are themselves systems, and may be living or non-living. Living systems are cybernetic systems. They respond to information from the environment by adjustive and adaptive behavior. Non-living cybernetic systems are human artifacts, and can only be understood in a human and social environment wherein those systems serve human needs instrumentally. Human life involves systemic interaction.

1 In a recent discussion of Congressional decision-making by members of the Washington, D.C. Political Science Association the phrase "ecology of a decision" was employed to designate the events, actors, informations, pressures, interests, etc. that produced a given legislative outcome.

2 Perhaps we are dealing basically with the logical category Aristotle called habitus - the thing in context. Actually, of course, most of the logical categories are defined by some sort of relation; certainly time, place, action, passion, posture and habitus. Even quantity as used by the sciences involves a relation to both an operation and a conceptual system of mensuration, while the category of quality inherently involves a relation to a perceptual apparatus, the selective apprehension of characteristics belonging to an object.

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Artifactual systems normally are defined instrumentally, in terms of the human purposes they serve. Marshall McLuhan, of course, conceives of man's artifacts as extensions of man and of the human personality; clothing as an extension of the skin, the telescope an extension of the eye, the automobile an extension of the legs, the library an extension of the memory. In fact the library is a partial social realization of the memory or the species through organized man-artifact interaction. For many applications both men and organized groups should probably be analyzed as man-machine systems or better, man-artifact systems. Clothing, shelter, tools, instruments and facilities are normally necessary to life and effective action.

Norbert Wiener referred to Cybernetics as the science of communication and control in animals and the machine. Yet in a very broad sense both organisms and social groupings, when viewed in terms of input-output relations, may be thought of as machines, that is real systems effecting transformations according to rules. The inputs and outputs across the boundaries of the concrete components of an ecological system are transactions. These exchanges define concretely the relations within and among the component real systems. Transactions involve transfers of energy, information, things, men and money. When dealing with the social ecology which is our principal concern in this paper, these exchanges occur principally among and between persons and groups. Both persons and groups are self-regulating systems, characterized by a boundary, by some degree of functional unity, and by responsiveness - they perceive, decide, and act.

During a recent management audit of my own institution I suggested that it might be fruitful to analyze the University as a system effecting programmed transformations. This would require a clear understanding and definition of the nature and range of outputs desired: research products; faculty participation in professional and cultural life in the U.S. and abroad; the range of graduates' skills, knowledges, attitudes and values by degree level and field - in terms of input faculty, students and plant. The nearest approach to this orientation can probably be found in the training and professional development of personnel in the military services and some civilian elements of the defense establishment.
In modelling the social system the boundaries of its single human elements are clear. Somewhat less clear but still distinct are the boundaries of corporate entities and associational groupings. Communitarian groupings and many functionally defined social systems (or subsystems) often have indistinct boundaries - boundary zones rather than frontiers. Functionally the natural boundaries of social systems may be defined in terms of the number and/or intensity of the interrelations among their own components and the elements of other systems. This transactional gradient may be employed to identify such major social systems as nations or economic regions or such minute social systems as the informal groupings within a corporate structure.

FIGURE 1 - TRANSACTIONAL GRADIENT

4One of my graduate students is currently attempting to identify such "natural" boundaries in Africa employing data on language, religion, tribe, political frontiers, economic interdependencies, etc.

5The role of personnel in enabling or disabling action could begin to be traced by a network analysis based on distribution lists and source and destination of telephone communications. This was suggested in 1954 as a device for identifying "nodes" or nodal personalities and roles in the administrative structure of the Defense establishment.
A traditional phrase has it that "Evil communications corrupt mores" (that is, norms of social behavior). It may be conceptually fruitful for us to assign a qualitative indicator to transactions; sales or exchanges of goods, praise, admonition, instruction or encouragement - for example - are positive transactions. Thefts, violence, curses, lies, injustices are negative transactions. The former unite men, the latter divide and isolate men. A war may greatly increase the level of transactions between two peoples - but insofar as most of these interrelations are negative in quality they detract from community.

The conception of men and groups as self-regulating systems permits analysis of a considerable part of the social universe in hierarchical terms. The basic component of society is the person who observes, decides and acts upon his environment. Unlike the analyses of the social system that conceive of social "roles" or "actions" as the basic elements of the system, this approach recognizes the dynamism of the system in time. Social "roles" or "actions" abstract from the concrete, living reality of men interacting among themselves in an environment of real objects.

Just as persons perceive, choose and act, so do social groupings. These capabilities of the group are, of course, grounded on the capabilities of its single members, enhanced by functional specialization. A characteristic of most families and of smaller communitarian groupings is the absence of rigid functional specialization while corporate bureaucracies (governmental, military, economic) tend to define the role and function of component groups and persons quite closely. For example, the conduct of a nation's foreign relations is normally the function of a specialized agency of government, a Ministry of Foreign Affairs, within which the intelligence function is clearly distinguished from policy-making, which is in turn organizationally distinct from the elements responsible for foreign policy implementation. Organizational subsystems and ultimately their human components respond autonomously to information inputs from higher echelons (orders or policy directives) by resource allocative decisions and plans of action directed at the achievement of their specified mission(s) or objectives.
This mode of conceptualizing the social universe produces a complex yet intelligible view of the social whole as comprised of a large number of autonomous persons grouped into functional organizations and associations which are themselves self-regulating systems. These are tied together up to a certain point by an organized "chain of command", up to another point by monitoring activities and occasionally direct intervention (usually a form of management by exception). At a certain level the hierarchical principle is replaced by interaction rules founded on the nature, structure and functions of the interacting elements. In social systems these interaction rules are to a considerable degree human artifacts; the product of legislation or usage. They in turn serve as information inputs that program the self-regulating elements in a society.

This is essentially a pluralistic vision of society in which various orders of values; political, economic, religious, ideological, geographic, etc. define the various inter-related social planes. On each of these planes there is a multiplicity of self-regulating social groupings interacting among themselves in relations of cooperation, conflict, competition, symbiosis, etc. These groupings are comprised of persons who are functionally specialized within them. Groups on diverse value planes interact with one another in the community.
In some cases a given organization will operate on a number of value planes and the greater the number it encompasses the more closely it approaches the nature of a community, which services all of the value orders of its members. It is interesting to note that as so-called "total systems capabilities" are being developed by American industrial concerns, they are moving into the area of community planning and development.

An integral community possesses elements (persons and organizations) on all planes; and may be distinct from other communities either by reasons of geography, or by reason of incompatible goal structures, operational codes, or in terms of variant value orientations. Actually you may have geographical overlays of distinct communities with a steep transactional gradient (blockage) between them. For example, the Christian and Socialist parties in interwar Austria formed quite distinct communities in terms of their associational life in almost every area of human interest despite the fact that their members occupied the same territory.

This mode of analysis permits a fairly clean cut approach to the empirical study of such concepts as "integration" and "segregation" in terms of the probability of transactions and especially communications among and between groups and individuals - as functions of the subcultures to which they belong. In different societies different characteristics will be prime indicators of membership in subcultures having a steep communications gradient between them. These include caste, class, race, religion, language etc. Communities that overlay the same territory are an analog of diverse species occupying the same territory as range or habitation. It would be theoretically possible, if it were thought desirable, to insulate the social and economic life of these communities. This could prove relevant to the problem of equitable space distribution among the peoples of the world while avoiding the catastrophic impact of attempting to equalize life styles and income levels.

Arnold Toynbee foresaw this possibility in terms of a world-wide social system resembling "shot silk" with overlays of semi-autonomous ethnic, national and other communities
united by some value - resembling the millet system of the Turkish Empire. This could be accomplished, of course, only by reducing the permeability of social boundaries and avoiding the type and degree of economic and cultural exchange that would utterly break down men's autonomous institutions and identities.

There are, it seems to me, two types of cosmopolitanism or ecumenism - one involves a disordered mixing of styles (architectural, linguistic, artistic, etc.) characteristic of a late sensate culture, syncretism, the blurring of moral distinctions, the loss of a clear-cut social identity. The second involves a recognition and acceptance of differences, intense local loyalties, both geographic and cultural, coupled with benevolence toward groups other than one's own and accepted patterns of reasonably non-disruptive conflict resolution. Too frequently attachment to a clear-cut cultural and national identity is viewed as inherently undesirable, implying bellicose, chauvinistic, intolerant, and illiberal attitudes. This certainly need not be the case. Indeed the greatest geniuses have precisely this clean-cut cultural identity. They are men of a given historical time and place, of clear ideas, characteristic style, and defined values.

May I suggest that we have criteria for the quality of a community. Quality is a function of the community's autonomy and "formedness" - its moral integrity, intellectual achievement, and artistic productivity within a common and accepted framework of reality-orientation, values and outlook.

Italy and Japan, each in its own way, represent consummate achievements in the visual arts. Each society manifests very great sensitivity to form, yet they are utterly distinct. It is unlikely that these separate patterns of development could have occurred historically except by reason of the paucity (or indeed, absence) of cultural exchanges. Would there be a gain to the whole human patrimony by providing, consciously, the conditions for at least some degree of autonomous cultural growth by the single peoples of the world - and by the single communities and regions of the various nations?

A great deal of the current concern with environmental planning is linked to questions of pollution - the degradation of the physical environment. Implicit in all of this is a value judgement regarding the "goodness" or "badness" of an
environment. It is polluted, that is bad with regard to whom or what? The obvious answer is - with regard to man. I think this answer is just and correct. More generally, the quality of an environment is a function of the quality of life it can sustain and the quality, the ontological "goodness", of a physical entity is related to its structural and functional complexity. Hence aptness to man is a legitimate measure of environmental quality.

As we consider environmental quality in these terms, however, the logic of our discussion forces us well beyond questions of smog and industrial waste as environmental pollutants. What of the social environment and its relation to quality of life and human formation? Our society, increasingly in recent years, has so broadly interpreted the concept of individual freedom that pollutants of the social environment are unassailable: chemicals and drugs that degrade the central nervous system; pornography; the vivid representation of violence in mass media; permissive policies regarding crimes against life, person, and property; extreme tendentiousness and occasional downright misrepresentation not only in advertising but in media claiming objectivity and even roles of cultural leadership.

In environmental planning, it must be realized that the community is the immediate social matrix within which men are formed by acting upon and influencing one another in a physical context that is in part natural and in part an artifact. In this view the community is a controlled environment directed at human development, through more or less closely programmed patterns of interpersonal and intergroup relations - and by providing an appropriate physical and cultural context. In a real sense the community may be considered a teaching machine whose formative influence persists for an entire lifetime. Some communitarian groupings have been quite consciously structured in this sense and directed at the formation of persons in terms of an ideal type: monasteries and convents, for example; the colleges of older English and continental universities; military groups such as guards regiments or the Janissaries. There is no reason why the civic community could not be similarly organized in terms of a diversity of functions, human types and human talents. There can be little doubt that the law-givers of antiquity like Solon and Numa Pompilus thought in these terms - and Plato is so sensitive to the subtle effects of environmental conditioning that he devotes considerable attention in the Republic to appropriate modalities of music. The Russians today are apparently well aware of the importance of the size, type and quality of toys in creating social expectations.
An emphasis on persons and cultural values as the principal output of the community rather than mere economic output measured as GNP - has great implications for the development process. Human talents and local institutions can be nurtured by insulating them from the destructive or demoralizing effects of excessive competition as they burgeon. This is done by the developing countries for industrial products. The infant industry argument has recognized validity internationally witness the privileged treatment accorded associate member of the Common Market. Can or should local industries and specialized products be protected on a regional or community basis? Concretely should the local baker or brewer be provided some competitive edge - or even assured competitive equality as regards a national brand? Should local building materials be encouraged? Of perhaps greater concern is the preservation of national, regional and local cultural traditions; arts and crafts, manners and customs, building styles, cuisine, folklore and history, games and toys, child rearing practices, marriage and funeral rites-in the presence of the slick, consumer tested, attractive and profitable culture products of the great culture emporia; New York, London, Paris, Rome. Even superb local craft traditions cannot survive this impact. They either succumb to the competition, or become attractive in international markets, move to a commercial basis and become subject to design and manufacturing standards imposed by Macy's buyers. Manners and customs survive only with difficulty in the presence of the demonstration effect of mass media or the behavioral changes required by modern tools and technologies.

By some degree of economic and cultural insulation from a cosmopolitan culture overwhelming in both quantity and slick superficial attractiveness ("quality", of sorts), perhaps the conditions of a manifold human development, varying in pace from people to people, from community to community, could be provided - if this should be thought desirable. Human talent could be provided with the opportunity for autonomous fulfillment in a decentralized manner.

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6 The propensity of talent to migrate to the great cosmopolitan centers is not new. At an exhibition on Tyrolean life and culture held at Innsbruck in 1963 it was interesting to note that virtually every famous man born in the Tyrol ended his life either in Vienna or in Rome.
A conscious recognition and provision for this development within the context of the community is now a real possibility. Ideally, perhaps, this should be done in freedom by a voluntary renunciation of certain types of individual and social input. This is done by athletes who voluntarily accept dietary controls, and by students whose required reading precluded alternative possible inputs.

One of the most critical questions confronting social planners today is the degree of freedom to be permitted in social relations. Expressed in reverse - what are the humanly desirable limits of planning? What is the ideal type for the creation of which social institutions are designed? At what point does even the conscious, systematic creation of the social and physical conditions for human creativity and fulfillment begin to destroy personality and reduce society to the complex yet stifling mechanism foreseen by Alexis deToqueville?

Above this race of men stands an immense and tutelary power, which takes upon itself alone to secure their gratifications, and to watch over their fate. That power is absolute, minute, regular, provident, and mild. It would be like the authority of a parent, if, like that authority, its object was to prepare men for manhood; but it seeks, on the contrary, to keep them in perpetual childhood: it is well content that the people should rejoice, provided they think of nothing but rejoicing. For their happiness such a government willingly labors, but it chooses to be the sole agent and the only arbiter of that happiness; it provides for their security foresees and supplies their necessities, facilitates their pleasures, manages their principal concerns, directs their industry, ...

After having thus successively taken each member of the community in its powerful grasp, and fashioned him at will, the supreme power then extends its arm over the whole community. It covers the surface of society with a network of small complicated rules, minute and uniform, through which the most original minds and the most energetic character cannot penetrate, to rise above the crowd. The will of man is not shattered, but softened, bent, and guided; men are seldom forced by it to act, but they are constantly restrained from acting: such a power does not destroy, but it prevents existence it does not tyrannize, but it compresses, enervates, extinguishes, and stupifies a people ...
Yet suppose the tutelary power implicit in our new capability of designing institutions, organizing events, providing quick changes of social strategies in response to unforeseen events or second order intersections of event sequences - suppose this tutelary power were concerned "to prepare men for manhood" to form autonomous persons, "doing their own thing" and doing it well, concerned with others, mature, wise and prudent.

We have begun to possess a capability to control our human and physical environment - and to create a society based on autonomous human responses to organized information inputs, a knowledge-based society whose principal output is further knowledge and increasingly complex forms and activities. Henry Adams foresaw an "ethereal phase" of civilization, highly developed, characterized by complex associational relations both psychic and social, possessed of depth and coherence and precisely because information rich, possessing the capability of providing an adequate physical basis of life to all. Our present technical capabilities and modes of conceptualizing the community can increasingly be employed for the conscious development, intellectual, spiritual and moral, of society's members in freedom, by a process or mutual responsive behavior under generally known constitutions, laws, and programs of interaction within an organized institutional and physical environment.

It is interesting in this regard to note recent studies of the characteristic or model human type produced by the Kibbutzim.
In his book, "The Philosophical Impact of Contemporary Physics", Capek points out the boxes within which scientists operate, boxes that are built by the philosophical leanings of the culture in which the scientist is raised. With many examples he shows how particular discoveries had to be made at approximately the time they were because of the prevailing beliefs. In a slightly different slant, Thomas Kuhn, in his book, "The Structure of Scientific Revolution," points out that the majority of scientific work is based upon existing paradigms, and has little to do with discovering new ones. Why rock the boat? Both these authors tend to substantiate the argument that the culture in which work is performed has a great deal to say about what work is done, how it is interpreted, and how it generates further work. This being the case, one should be able to conclude that new developments in the communications technology of any culture are a function of the host culture. But on the other hand, culture is the result of the history of all the previous communications, innovations and developments. Hence, we have a circular situation where communication determines culture and culture determines communications.

Conventional market research techniques endeavour to see how a particular service or article will fit the desires of the members of a given culture. In effect, a measurement is made between concept and a particular culture's yearnings. The culture is asked to vote on this or that particular service or article. Clearly, there was never a more culturally biased technique of measurement devised by man. To use such culturally biased measures in assessing the long term work of a communications innovation could be sheer folly. In the short term, for an offering that was not going to blanket the entire culture, such an analysis
or measure is quite justifiable. However, in terms of the long term situation, and for services that will penetrate even the remotest corners of the culture, such planning is merely steering the boat by keeping the wake straight. Hence, most of the techniques currently espoused by the market research and sales analysis people are grossly inadequate for any future heavy duty communications services. The effect is rather like that which one gets from inbreeding. There is little likelihood that the culture will remain reasonably balanced and not run off in an unstable direction.

The implication which begins to appear is that some method of planning must be devised that could perhaps result in the offering of goods and services that might not be the ones chosen freely by the society. This infers that someone must make decisions. Act in the role of God. Decide which way the culture will go. This situation is not quite this bad, nor is it even proven that any metaphysical questions are involved. In some of the work done by Lawrence Slobodkin, the stability factors present in a population striving to exist under a changed environment involved things with many time constants. Slobodkin has suggested that models can be built to demonstrate evolutionary processes of quite a complex nature, that do not require any metaphysical consideration whatsoever.

After reading Slobodkin's reports of his ecological studies one cannot help but observe that if there is any sin involved, it is in being ignorant of the relationships between communications and culture and so ignoring them rather than in attempting to learn, understand and use this knowledge for the betterment of man. Let us, then, dispense with any fears or prejudices that may come about from accepting the hypothesis that the design of communications environments has an effect upon all succeeding generations and treat it as rationally and coolly as we would the fact that pollution, fallout, etc. can have the same universal and long lasting effect.
Very little is known about the time factors involved in the relationship between changes in the communications environment and cultural changes. Given a sudden change in the communications environment of a culture, what kind of times might be expected to pass before different sectors of the society appear to react and adapt? The more impressionable youth would likely be affected first. Children who are exposed to a new medium along with their older relatives, would be expected to show effects first. That this is so, was recently illustrated by a study of "near-point" measurements made by the optometrist Dr. Hurst, in his Ontario practice over the past ten or fifteen years. Concurrent with the adoption of television, the "near-point" for children dropped from the usual sixteen inches to less than half that amount.

In his pre-puberty years, man is very susceptible to learning the communications biases of a society, and in his post-puberty years tends to retain the training he has had. Changes in the communications environment occurring after this time are likely to be less disruptive than those before. This being the case, there is little chance that the billions of dollars now being spent in developing new communications technologies have any significant guidance that is responsive to the effects of the development of the last few decades. The decisions now are being made by people who had a primarily print-oriented background augmented by some radio and film during their youth. Here, perhaps, we see the importance of the time factors referred to in Slobodkin's work. The danger here is one of instability, however, and could result in the over-development of a particular strategy.

It is interesting to observe that those who are planning Picturephone for our future were not what one might call television children. They had essentially the same communications background in their youth as the developers of television had. Consequently, they are insensitive to the meaning of this new medium and may in fact be embarked on a strategy that is not optimal. In Slobodkin's work, he is concerned with the survival of whole species, and the loss of a culture or two because of particular instabilities troubles him not. If I
happen to be a member of one of those cultures, I am troubled. The instabilities are certainly there in his model, and can affect an individual culture quite disastrously. However, in terms of the total species, the probability seems to favour his model as being a successful evolutionary strategy.

With the invisible pervasiveness of the symbiotic relationship between culture and communications, it becomes mandatory that any viable long range planning be drawn from an acultural base. The short term strategies to achieve the long term goals can certainly be oriented toward the desires of the culture. With knowledge gained through research and proper experimentation, a bias or pressure should be kept on the market-research directed projects, to keep them oriented in a meaningful direction. Later on in this paper, we shall develop alternative measures to market research which can be used to assess the significance of a communications type service. These measures are not concerned with window dressing aspects but rather with the essence of the service itself. This gives plenty of freedom for designing a marketable service. In attempting to generate such value systems, several approaches were taken, some more fruitful than others.

Our particular culture seems to have a pronounced tendency to classify things. For example, consider the previous sentence. Certainly much knowledge has been generated using the taxonomical approach. Usually this method involves the identification of stable states, or nouns; rather than processes, or verbs. If we are to build a meaningful guide to designing communications environments for the future, we should be less concerned with a taxonomical description of the past, and more concerned with some sort of identification or inventory of the processes of society that communications changes effected. Media students point out that our tendency towards classification of stable states stems from our long history of phonetic literacy.
In the above situation, we have an example of how the communications environment can shape culture, and how culture can shape the manner in which that environment is likely to evolve. Any analysis of communications and its role in society at large should have two characteristics that until now have been singularly absent from the planning work in this area: The analysis should be as free from cultural bias as possible, and should also be process oriented rather than taxonomical in nature.

FIRST MEASURE

Communications developments have been occurring for the last fifty thousand years, and the effects have largely been ignored. Over this period of time, these events took place in a wide range of cultures.

With such a rich source of input data as this, the next question is what ground rules should be used to generate the patterns of insight? Since there are more than a half dozen really big events of a communications revolutionary nature involved, one can look for similarities in the patterns of their effects on their particular host societies in terms of the social processes affected. What essential social processes were significantly affected by these various revolutions, and what pattern emerges from an analysis of this inventory?

We have a rich mosaic of stimulants of cultural change which began with the invention of speech -- if one can refer to such a happening as an invention -- some fifty thousand years ago. This was followed by a series of developments including cuneiform writing around six thousand B.C., the significant adoption of the phonetic alphabet by the Greeks around six hundred B.C., the development of papyrus and money and the fifteenth century innovation of the moveable type
printing press. All this was followed eventually by the cupboardful of electrical innovations in our times.

In the hopes that some underlying process can be detected by identifying those essential invariants that always seemed to be on the upswing in terms of social processes with each of these revolutions, let us examine the list and see what comes out.

In facing such a list with so demanding a task, one is tempted to partition the job in hope of achieving simplification without loss of generality. The partitioning we chose was aimed at bringing any cultural bias in the analysis closer to the surface. The field of communications was partitioned into three areas: 1. communications with the past; 2. communications between individuals; and 3. communications within and between large groups of individuals. This partitioning undoubtedly had a marked effect upon the findings and may have generated parameters that are not necessarily mutually independent. Our interest at the moment is in a pragmatic tool rather than a beautiful theory with proofs of sufficiency and necessity. This may be achieved some day, but for now a viable technology is sufficient.

When one examines the list of communications revolutions above, in juxtaposition with the concepts of the first subclassification of communication (that is, communications with the past) it is quite obvious that each succeeding communications revolution made stored human experience easier to access. In addition, this ease was manifested by a much increased use of stored human experience in the daily transactions of men. So here, we have two notions: stored human experience was always made easier to access and there was more accessing done, with each communications revolution. Even the telephone made it easier to access an expert. Certainly the printing press was a dynamic revolution in this area. So our first communications measure can be described as the ease with which stored human experience is accessed. To cause another communications revolution, one might expect to have to make a significant increase in the ease with which stored human experience can be accessed. Coincident with this, one will have to be certain this increased ease causes increased traffic into stored human experience.
The adoption of the phonetic alphabet by the Greeks between the ninth and fifth centuries B.C., is perhaps the earliest documented example of how a significant change in the ease of accessing stored human experience can affect a total society. Writing had existed before the phonetic alphabet, in earlier Mycenaean times, but this form of writing was very clumsy and only good enough for making lists and for bookkeeping but very inadequate for the other uses of writing. The Greeks added vowels to the Phoenician consonants, which perfected a phonetic alphabet. This simple adaptation permitted the technology of writing to be used to convey the sounds so essential to their previous means of storing human experience, poetry. As Havelock points out in his "Preface to Plato", the plays and poetry of early Greece were in fact the encyclopedias of that period. Homer tells us how to build a boat, how to get a crew, and finally how to sail the boat. The material had to be poetic for easy memorization. The new phonetic alphabet, which Athens finally made official in the fifth century B.C., captured all the sounds and so presented an acceptable transition for the bulk of the society.

Two factors conspired to popularize the phonetic alphabet. It was familiar being sound oriented; and a student could become proficient in this new technique in a matter of two or three years as compared to a decade or so for the former writing techniques. As Havelock points out in his book, the widespread adoption of the phonetic alphabet permitted the Greek citizen to react in a detached way, and not blindly in accordance with some quotation from Homer. He now could separate himself from a situation and reason through the various options open to him, without risk of forgetting some of the essentials. An oral society has to devote so much of its energy to just storing information that it is not free to do much intellectual exploring. By easing the access to stored human experience, the phonetic alphabet permitted the Greeks to enjoy a period of extremely rapid development.
Not so well documented is the correlation between the development of writing in Mesopotamia and the emergence of the city. Interestingly enough, the earliest prototype of the massive ziggurat temple and the introduction of pictographs to keep administration records appear to have occurred virtually simultaneously. The early forms of writing, using pictographs and various other iconic forms, were so complex as to make it necessary to set up the so-called temple bureaucracy in order to provide protection for the immense learning effort required to master the skills. The temple became the means of storing the vital information for the society. It took almost another thousand years before formal contracts for land sales began to appear, being written in cuneiform. By this time, cities in the area were quite common and a thriving trading culture was well on its way. It is interesting to note that hieroglyphic writing appeared in Egypt at about the same period that writing occurred in Mesopotamia.

A logographic system of writing evolved in China during the beginning of the Shang dynasty around 1500 B.C. This period brought the development of large imposing palaces, irrigation works, warehouses and graineries. The pattern of intensive development, intellectual achievements etc., followed later by strife between cities seems to have been repeated in China as well as in Greece. Could the introduction of a communications environment change which eases the access to stored human experience in a significant way initiate a period of intense development followed by a period of tense political unrest? The increase in productivity brought about by the increased ease of accessing stored human experience eventually makes it such that the change which caused the increase of productivity is now not sufficient to meet the later needs of society.

Had the Greeks been fortunate enough to discover the moveable-type printing press somewhere around 350 B.C., what might the world have been like? Perhaps the Greek
empire would not have finished with a blaze under Alexander, but gone on to even greater heights. Had the invention occurred a hundred years earlier, during the thirty years peace between Athens and Sparta, perhaps even Alexander would have been unnecessary to hold together the Greek empire. The pattern would appear to suggest that, following the introduction of a popularly accepted means of easing the access to stored human experience the productivity of the society increases significantly. This increase in productivity finally results in a situation where it is cheaper to do something than to resort to accessing the pertinent stored human experience. For example, today in the research world, it is suggested that if a research program costs less than fifty thousand dollars, it is cheaper to do the project than to search the literature to see if it has ever been done before. It would appear that the increase in productivity, which we gained from the printing press and other recent communications inventions, has made it such that the cost of accessing stored human experience is just too great—and we end up re-inventing the wheel. This pattern appears to have been around for some four thousand years. If a significant change is made that eases the access to stored human experience, the host society experiences a renaissance—an increase in productivity, art forms, and in general a decrease in political anxieties. Eventually, the thing catches up with itself, and this increased productivity makes it easier to try the effort than to read about the results. It becomes time either to put up with the political instability which will result from this situation or to invent a new communications environment that makes it still easier to access stored human experience.

Even the telephone makes stored human experience easy to access. It is so easy to find out something through the use of the telephone that we frequently overlook its importance in this area. Much of the efficiency of today's world of commerce depends on this aspect of the telephone. Certainly the scientific journal fulfills a similar role. We have had a succession of these kinds
of improvements easing our access to stored human experience in a sufficiently close series to have protected us from the effects of the pattern outlined above as a result of the tremendous impact of the invention of the printing press. The printing press, invented during a period of great civil strife in Europe, got a total intellectual, religious, and artistic revolution underway within a hundred years. It took the printing press a mere fifty years to eliminate scriptoria as significant publishers of books. Hard on the heels of the printing press came such things as the newspapers, journals and magazines. These together with the telephone, provided a communications environment that was making it easier to access stored human experience. Neither radio nor television have kept up this tradition, for they have little provision for choice on behalf of the individual user. In many regards, radio and television put us back to the kind of communications environment that the Greeks had before the advent of the phonetic alphabet. Can we develop new changes in our communications environment that will make stored human experience more easily accessible and so free ourselves from the threat of the political instabilities which the patterns of history would suggest might be our fate?

In his book, "A Communications Model for Urban Growth", R. L. Meier points out the importance to a society of its stored information, and he goes on to stress that it is the traffic into this stored material that counts, not just the size of the library. In the end, the limitation in this traffic flow must in fact be the capacity of a human to absorb material. Surely electronic libraries are almost here, perhaps we can direct our attention to the problem they will raise, which is: how can we sock it to a man even faster? What simple and reasonable steps can be taken to enlarge the channel capacity between the system and the man? The questions raised in this examination should have a bearing on the design of any electronic library, for it is only reasonable that the effects of a new technology should be investigated before that technology is unleashed. The next few paragraphs examine three strategies that might help increase the machine/man channel capacity, and so permit the man to make fuller use of an electronic library.
There appear to be three avenues available to still further ease the accessing of stored human experience by increasing the system/man capability. First the computer should eventually be capable of managing the selection of pertinent material for each individual user. Certainly much will have to be learned about the science of linguistics and semantics before any truly meaningful computer-oriented information retrieval system can be built. For simple goal-oriented missions the computer can serve admirably now in an information retrieval system. But for the more complex situations involving whole cultures much remains to be discovered. The problem inherent in information retrieval is very similar to that in machine translation and computer assisted instruction. A breakthrough in any of these areas will be most welcome for the other two.

The second area of some interest is one referred to as "speed reading". The mere fact that a sizable portion of the population is willing to expend its resources of time and money to attempt to learn these techniques suggest that the technique is real. No adequate scientific research has been done to determine what speed reading really is, or what processes are involved, and until this work has been done not much can be said about this strategy.

A third possibility of increasing the ease of accessing stored human experience involves the design of a new form of writing. The writing techniques that we use today were developed to suit the technology of a stick scratching in sand. We are somewhat more sophisticated today - surely we could develop symbols better suited for electronic display and human interpretation. The advantage that the phonetic alphabet had, in terms of its short learning time, may not be so significant now that we have the computer to aid us in teaching the more complex forms of writing. This area of research is something that could have significant pay-off
potential. The problems that we will face in the future with respect to managing our stored human experience are such that the mere volume of material must be controlled carefully. To make decisions as to what one should keep and what one should throw out will become very difficult. To compensate for this difficulty, it will become necessary, sooner or later, to develop techniques of storing information using a minimum of storage space. Today in the communications industry, we hear of great concern for the future demands of channel space. This implies a possible shortage of realtime communications facilities. In all probability, the really serious shortage will be for storage space of an economical nature, i.e. storage space that can be accessed quickly and accurately.

Stored human experience when exhibited in television format requires a very considerable bandwidth. When this same experience is converted to written language in the phonetic alphabet, and these characters are encoded electrically and stored in this fashion, the result is not much better. Speed readers will require this later form of information at such a rate that almost the same kind of transmission facilities would be required to service their needs as the television viewer needs. The iconic forms of Chinese-like writing offer a significant saving. One must observe, at this point, that cartoon-like representations used in many training films have some of this iconic form about them and they certainly do have impact. The significance here is that these new iconic forms are time-varying and this time varying iconic form may be the most significant invention of the past hundred years.

Which of the three techniques outlined above for further easing access to stored human experience will be developed, time alone will tell. In all probability, all three will be needed to cope with the complexities of our future. In order to be worth its salt any significant communications development will have to ease the access to stored human experience, and this must be evidenced by a significant increase in the usage of the stored material.
The past communications revolutions pertaining to the access to stored material having been dealt with, we consider the other two areas: communications between two or three individuals, and communications within and between large groups of individuals.

Everything is included in the meaning of communications, from mere message transmitting to moments of true commune or oneness. It is said the Eskimos have thirty-odd words describing various types of snow, so important is snow to their life. Perhaps we need additional names for the various levels of communication, for surely this is as important to us as snow is to the Eskimo. Lacking these linguistic tools, can we develop an alternate means of ordering the involvement or oneness that a communications technique evokes in its users? The notions developed in the following material were designed to measure just this particular aspect of communications between two or more individuals. Communications in and between groups is the subject of a later chapter.

Man operates in many types of spaces over and above the conventional physical one involving houses, offices, automobiles and just plain land. There is the concept of activity space, such as a person's job, or role, or speciality. There are also information spaces that people occupy and identify with.

Language is an information space, for it is used by or occupied by man and man identifies himself with his language. Books, newspapers, television, etc. may also be considered as information spaces. By considering some of the properties of these different spaces we shall develop some insight into the ways in which information is handled by man.

Conversation represents a rather interesting manifestation of the spatial game. If we consider as our
information space the acoustic-language space enveloping the two conversants, we have the situation where the information space is occupied by one person, or the other, alternately; and a well understood game is played when one wishes to retire or the other wishes to advance into possession of the space. One of the basic concepts about space and animals is that the incumbent appears to have a particular advantage in warding off an assailant. He who has, will probably hold. In the conversation situation, the talker seems to have an advantage over the interrupter, and it now seems to be that this advantage is more basic than something based on good manners alone. It might be suggested at this point, that conversation represents one of the highest games on the scale of spatial relationships. Here there are rapid exchanges of tenure, of roles and virtually intellectual exchanges of being. This, if you will, is a game played in an abstract space with two fundamental drives, identity and stimulation.

Returning to the animal world, the kob, a member of the gazelle family of Africa, has a number of interesting spatial behaviour characteristics that seem to have their parallel in the conversational habits of man. At the appointed time, which kobs seem to know instinctively, the whole population of a thousand or so will descend upon the stamping ground. Like it's the place to be, baby. This stamping ground consists of some twenty areas resembling putting greens, in close proximity to each other. The most significant males will jostle for sole possession of the central or most prestigious putting greens, while the less successful will fend off the remaining male population and occupy the peripheral putting greens. Mr. It, in the eyes of the female kob, is the tenant of the central putting greens, and her attentions are first directed towards him, but failing that, she may choose a lesser light.

Mr. It has a tremendous challenge. He must defend his area from attack by his neighbours, and in addition, attend to the crowds of admirers. Nature does help him, however, for there is this intrinsic psychological and very real advantage in being the incumbent when it comes to a border clash. This is a proven thing in the evolving science of
ethology, the exact study of the biology of behaviour. However, if Mr. It gets thirsty, or hungry, or tired and leaves his putting green, he must again fight his way to the top.

Picture then, a number of arenas, each with a single figure holding tenure, but nevertheless subject to attack from any of his lesser neighbours. The reward for holding onto the special spaces is increased attention.

So much for the kob, what of the analogy with conversation?

When two people are talking, the situation is rather like that which would occur if there was only one putting green for the kob to battle over. In conversation one person takes possession of the common information space, and holds it until he tires, thirsts, or otherwise lacks stimulation (has made his point). At this point he can retire, and a second person can easily gain possession of the space. However, the dynamics of an interruption gives the odds to the talker rather than the interrupter. In another way, the situation resembles the kob stamping ground, for the usual reward for possession of the information space in the conversation situation is attention, but this time it is intellectual attention rather than physical as in the kob case.

The situation becomes even more analogous when one compares such conversational orgies as cocktail parties to the full scale show of the kob stamping ground game. The dominant talkers of this type of conversation will move on to try their hand at dominating a group whose "address" is more prestigious. The conversation is rarely halted for the "kob" who has to make a trip to the bar! He must fight his way back in, all the way.

In many ways one can draw parallels between information space mores and territorial space mores, and from the parallels, some added insight can be gained into the problems of designing communication systems. Returning for the moment to the concept of conversation or real time communication, the proposal is herein put forth that a common or mutually shared information space must exist for communication to occur. We must speak the same
language, our use of jargon must be from common fields, you must be where you can hear me, etc., etc. Furthermore, the efficiency, or depth, or involvement, or what you will, of the communication would appear to vary directly with the size of the common information space shared by the communicants.

To fully share a thing, both parties should have simultaneous access to it. In simple conversation, the acoustic space enveloping the communicants is fully shared, and both parties can both talk and listen simultaneously should they so desire. The space is fully shared in a totally communal way. Perhaps we have overlooked the importance of those brief periods during which both parties are talking. From behaviour studies of animals, one could argue that these periods of simultaneous talking are where the significant emotional releases occur. To design communications systems that inhibit such occurrences seems folly, yet many of our present telecommunications systems do just that. In assessing the size of the common information space created in any system, we are interested in the instantaneous size, and not the sequential or average size. There is no way a push-to-talk system can create the intimate involvement that a fully duplex telephone system creates.

We communicate through the language of action. This language has several component languages: the languages of speech, non-verbal sounds, gestures, writing, and many others. The more of these we can share simultaneously in any communications systems, the richer the experience will be. Interruptions may occur in one language through the use of another language, for example, the grunt. The larger the size of the shared information space, the richer the choice for interrupt strategies becomes. The game becomes more fun...more involving...more challenging.

Let us consider the telephone for a moment. The telephone extended the physical distance over which a common acoustical space between two communicants could be maintained. Because the aural field has virtually no point of view, (or in other words it envelopes both communicants) it does provide the common information space in which the two communicants can play their little game, according to the mores of their culture in this respect.
In contrast to the aural field which has no well-defined point of view, the visual field does in fact have a personal point of view for each individual viewer. It is for this reason that the Picturephone rates very low in terms of the size of the common information space concept. Consider the example of one communicant pointing at his screen. One must agree that the chap at the other end will see only the end of a finger which will bear no relationship to the thing which that finger is attempting to identify. Here is a real example of two separate and non-interacting information spaces. Resort would have to be made to the common aural field to break this impasse. In all probability, the Picturephone will be equipped with switching or loudspeaking type telephones, and the size of the aural common information space becomes reduced. Hence, for real conversation, the picturephone may rate even lower than the conventional telephone.

This is not to say that video-phones aren't effective devices for some lower forms of communication. Consider the class of master-slave situations, such as salesman-customer, boss-employee, man-machine, etc. It is here where the Picturephone shines. However, very little communing occurs in this class of communications.

Assessment of the size of the common information space which a particular system permits the users to dynamically occupy gives a measure of that system's ability to be better than a mere message passer in the direction of letting the communicants experience a common oneness.

The notions presented in this chapter are not too different from Dewey's interpretation of communication, which he viewed as being the interpenetration of perspectives, the communicating individuals actually sharing, for the moment at least, some of each other's points of view. The Schutz-Scheler concept of intersubjectivity, being the joint consciousness of communicating individuals, also fits with the large common information space interpretation of communication. Both of these descriptions
of communication have to do with complex intercourse between social beings, and in no way resembles the kind of communication Shannon was considering when he worked out his information theory. By establishing a scale in terms of the size of the shared or common information space occupied by the communicants, we have a means of ordering various communications devices, systems or techniques in terms of their ability to let man approach the Dewey or Schutz-Scheler kind of communications.

With the possible exception of the invention of language itself, all major communications revolutions have tended to increase the size of the common information space shared by the communicants. Some philosophers suggest that before man learned to speak, he shared a cosmic oneness with his fellows. Some even suggest that the result of our electronic technology will be the re-establishment of this state. The trend would appear to be there in the historical analysis of our communications history, represented by the ever increasing size of this common or shared information space.

**THIRD MEASURE**

The partitioning which divided communications between individuals from communications within and between groups has now been half dealt with, leaving the area of communications in and between groups. In this sector of communications, all the significant communications revolutions have made it easier for the host society to discover and develop its nascent consensuses.

This observation forms the essence of the third measure. However, if the word communication is inadequate to describe the range of processes involved, then the word consensus is doubly inadequate. Much of the material in this chapter is intended to explore wide meanings that can be associated with this term.

For a beginning, our definition of consensus stems from the interactionist social psychology of Dewey and Mead, and stresses the co-orientation of individuals within a group toward a statement, rather than the individual orientations of the members of the group.
In a group of ten people, we are concerned with the processes involved in the first few recognizing a need to define the group and bring it together and not the conversion of the die-hards. The significant communications revolutions have each helped their host societies discover, develop and reject an increasingly rich, pluralistic and complex set of coexistent consensuses.

For fifty years sociologists of note have pleaded the cause of the fundamental importance of consensus to sociology. Unfortunately, not too much has been done, and it is only recently that the subject is gaining the kind of attention it should merit from these earlier pleas. Orin Klapp suggests that consensus should have the same kind of importance to sociology, that energy has to physics. He goes on to suggest that culture, structure, norm, role, symbol, etc. should be treated as special forms of consensus. Recent sociological research literature contains an increasing quantity of material on consensus, generally classified under the misleading heading of "Public Opinion".

In his Presidential address before the American Sociological Society in 1947, Lewis Wirth said: "I regard the study of consensus as the central task of sociology, which is to understand the behaviour of man, insofar as that behaviour is influenced by group life. Because the mark of any society is the capacity of its members to understand one another and to act in concert toward common objectives and under common norms, the analysis of consensus rightly constitutes the focus of sociological investigation". If a communications system is to pay its way in a society, it can only do so because the overall measure of that society has been increased. For the total measure of a society to significantly increase, there must be an increase in the capacity of that society for its members to understand one another and to act in concert toward common objectives. It would seem as if it is almost a necessary condition that for any communication system to be significant to a society it must contribute to the consensus-forming processes of that society.

Let us consider some simple consensus-forming systems that are at work in our society today. First of all, we will examine the role of money, then how popular songs are selected, and then let us look at a technique that was developed for the specific purpose of generating consensus with respect to technological forecasting.
Money is one of the finest consensus-forming systems devised by man. In a very elegant way, it decides how many Mustangs will be built, how much bread will be baked, and how many bridges will be constructed. Although the system is far from perfect, we have come a long way on the simple concepts involved in this communications medium. If you do the right thing, you receive money. This permits you to do more of those things, and so performance acceptable to society is rewarded by encouragement to continue playing the game the same way, whereas unacceptable performance is rewarded by denial. This rich pluralism and the freedom to annihilate oneself makes this system a very effective and stimulating one.

The choosing of the popular songs of the day is based upon record sales and various other voting techniques which boil down the preferences of listeners to radio and television. The popular songs are given prominent display in these media and to the extent that the broadcaster can pick the right songs, his station gets more listeners, and so the songs he plays get more support. It is a complex, fast acting system. It is so fast acting, that over a single decade, an entirely new establishment took over in a smooth evolutionary fashion. The Beatles caused a complete re-alignment of the pecking order without anybody being seriously hurt. Nobody was shot, there was no revolution and today's music is totally different from that of a decade ago. It is interesting to note that in the pre-radio days, a hit song would last for most of the year, while after radio, it would last a month or so. Today, if it lasts a week or two we are seeing a good one. The music publishing business fifty years ago involved printing music on paper, while today it involves operating a communications network that handles the payment of royalty and performance rights fees. This is the coupling between the monetary consensus forming system and the one being discussed here.

In Project Delphi, the leading scientific thinkers of the world were polled with respect to when they considered certain events would come to pass. The results of this questioning were processed and plotted to show the spread in opinion. These distributions were then attached to a repeat round of questions which were then mailed out, and the experts reconsidered their estimates. Lo and behold, when the results of the second round were analyzed, the spread was less! Consensus has been generated! Something had been generated from nothing! From processed information and feedback.
In any consensus discovering system, there appears to be both reduction or filtering of information, and feedback involved as fundamental processes. In Project Delphi, one didn't know where the individual estimates belonging to each expert lay, one could only tell the shape of the distribution curve of all of the guesses and so there was data reduction. In the case of the popular songs, the disc jockey doesn't know who it is that bought which record, he only knows the crude statistics of how many people bought, and this again represents data reduction. In both cases, there is feedback. In Project Delphi, the results of the survey were passed out to the experts for the second round. In the popular music situation the results of the voting, i.e. record purchasing, are displayed to the voters by such programs as the "The Top 50". The manufacturer of Mustangs doesn't know who bought his cars, he is concerned only with the number of cars that were sold. Money is inherently a data reducing system, and the fact that it comes back to him and permits him to build more, is a manifestation of the feedback aspects.

Interestingly enough, sociologists suggest that the more complex the transaction the more consensus there must be for co-orientation to occur. As mankind travels the natural process of evolution that begins with primitive randomness and moves towards ordered complexity, it becomes obvious that he must find better and better techniques for discovering and developing nascent consensus. This process of discovering consensus must be continually improved in order that this will not in fact be the limitation that cripples our sociological evolution. Certainly the problems we face in our society today are so complex, and so ill-defined, that the common methods of consensus generation which we use in the political arenas today, seem woefully inadequate. If, as we pointed out before, our consensus discovering systems consists of feedback and data reduction processes, then along with communications we should be able to make something a little better than the system we now use. This is not the first time communications technology has been used to help a society discover or generate consensus. The Greek amphitheatre, where the citizens met, is a prime example of using architectural technology to achieve these ends. On the opposite side of the coin, it has been observed that the Egyptian act of withholding the papyrus supply from Rome contributed significantly to the demise of the empire.
Papyrus was the vehicle through which the authority of Rome was conveyed to the outposts of the empire. Cutting off the supply of papyrus cut the essential lines of communications, and there was no longer any viable consensus amongst the distant factions, and so no more empire.

Because of the mixed bag of emotions the word "consensus" brings forth, let me repeat the restricted meaning it has in our study. In no significant way are we interested in achieving unanimity among a population but rather we are interested in bringing into contact individuals of like mind very early in the development of an idea. It is the "Pre-consensus" stage or the development of nascent consensus that concerns us. It is this process that we are concerned with when we meet the term "consensus producing system", and not in any way the notion of influencing public opinion by propaganda or the like. We are interested in consensus only while it is still young and tender, and not at all interested in its tough old age. It is essential that this be properly understood. The telephone significantly aids this infant aspect of consensus. This is the kind of thing we are looking for in this measure.

Mere biological needs also act as a consensus forming environment, causing men to agree on a course of common action long before they would in the absence of that need. War is another very powerful consensus producing element. Our recent disenchantment with authoritarianism probably stems from the dual causes of an increase in the speed with which obsolescence occurs and the inability of the mere biological needs to perform its share of the consensus-producing requirements of our increasingly affluent society. Can we invent a communications system to do the consensus producing that want, war, poverty and need performed previously? And can it be more sensitive to our individual needs than the TV/advertising consortium that is certainly very highly consensus forming in an all too simplistic way?

Clearly the rules used in the refining or data reduction portion of consensus-forming are delicate, vital and controlling. These must be thoroughly researched and adequately understood.
But it is, after all, this refining or reducing process that can protect us from an information overload situation. One might expect a system of this nature to create an environment that would interact with the members of a particular corporate mini-state for example, in a meaningful and almost fun-like way, that would so raise their competences as to permit them to deal with the complexities of their tasks in a more rational and productive manner. Within this kind of environment, the tasks of learning, working and teaching smear into one. If we really win, it may even be entertaining and leisurely. After all this, the third measure may be stated as:

The ease with which the host society can discover and develop new consensuses.

THE OTHER HALF

At the beginning, we attempted to make our measures of communications as independent of cultural influences as possible. This was done for the very good reason of simplifying the task, and to remove the pervasive biases we all have in analyzing communications. This limitation is not an insignificant one.

The measures outlined previously are extremely useful in determining the difference between an Information Retrieval Television system and the Broadcast type of television system. The system also clearly differentiates between the book and the telephone. The characteristics and specialities of each of these media can be observed quite clearly. The system, however, provides little insight into the difference between Coloured Television and Monochrome Television for instance. It is in the area of this latter kind of differentiation that the limitation imposed by the desire to keep this study separate from cultural and perceptual influences occurs.
The interface between individual users and the actual equipment itself is an extremely important one, and involves very basic behaviour patterns related to perception. As we observed earlier, perception is a function of culture and communications environment. Many studies are proceeding in this area but much remains to be done.

In order to illustrate the significance of this limitation, consider the North American concept of Picturephone. When Picturephone service is examined in terms of the three measures established earlier, we find that the service is very close to the existing telephone, with essentially no advantages. Since Picturephone is actually a telephone with a television link added, by examining the addition we should be able to say something about the relative improvements.

In the Picturephone service, each user views his "mate" through a television system. There is no shared visual space. There is no single visual space in which they can interact. I see you. You see me. Nowhere can my finger point to your nose in a meaningful way. Because there is no shared visual space, the complete Picturephone service rates no higher than mere telephone service in this important measure.

Present plans for Picturephone do not involve significantly increasing the ease with which a user can access stored human experience, beyond that which is currently available by telephone. Picturephone does appear to help its users develop their tender consensuses and so it may represent some improvement over telephone in this third measure. Since most people would prefer not to hold a handset while being viewed on Picturephone, the user of a hands-free telephone facility may in fact somewhat reduce the size of the acoustic shared space, and so produce a final result that may be little better than the classic telephone.

It appears, however, that Picturephone is a very appealing concept. Obviously, its appeal must come from some other area, one that lies outside the measures described above. Professor McLuhan's work would suggest that part of the appeal stems from the involvement the user experiences through mere exposure to the camera. Observation of new users would seem to substantiate his view! Perhaps the significant value of Picturephone lies in the half of communications that is totally tied up in the cultural and perceptive areas. The value
of such a service may be just as great, but in terms of its total cost-benefit analysis to the society, it may in fact be a rather indulgent type of value.

Clearly much research remains to be done. Research is in a most difficult area, involving the relationships between communications, culture, and perception. An area wherein everyone is an expert, because he communicates, he perceives, and he knows all about one culture. A field that is most complex, and yet so very fundamental. In retrospect, the decision to make this study as independent of cultural bias as possible is perhaps the key to having produced any output at all. However, this other half of the work still remains to be done. The measures delineated in this study can be used to define some general systems characteristics, but the actual terminals themselves will have to be designed in accordance with what is discovered in this other half of the job.

For now, it would appear that the measures we have can relate to the very long term aspects of the communications problems and to the structural relationships. The fine grain decisions as to the specifics of the man/system interface require further research.

In the next chapter, we shall consider these measures from a critical standpoint and attempt to evaluate them. Following this, the measures will be used to assess some current and future communications systems.

EVALUATION

One of the most important steps in any inductive reasoning process is that of testing the hypotheses discovered in the earlier stages. In this chapter we shall examine the three measures of communication systems in this regard.
Because historical data were used in the generation of the hypotheses, there is nothing to be gained in the use of this kind of data for the testing of the hypotheses so generated. Such an analysis would give our three communication measures a very high rating. It is sufficient to observe that historical data supports the validity of these measures.

One reasonably significant communications system has been designed to illustrate the effectiveness of the first measure. As a result of a detailed study of the use of audio visual aids in present day school systems, a traffic oriented scheme was developed in which use was made of a closed circuit television method of retrieval.

As a result of examining several recent systems for supplying audio visual experience in the classroom, it was concluded that no significant increase in information flow had occurred in the average classroom. In the case of Project Discovery, where individual classrooms were equipped with suitable projectors and libraries of films were established in the test schools, this situation was particularly apparent.

There are two aspects of traffic theory which we will be considering:

. The amount of material flowing, and
. The probability of the system meeting the individual's demands.

The first notion is a measure of utilization of the system, and can be in terms of the utilization by an average consumer or it can be the grand total of all the consumers. In our case, we are interested in the percentage of time the average user is using the system. The second factor, known as the grade of service, is an expression of the probability that a user will be denied service because the system is too busy. In the conventional telephone system this probability usually runs below one per cent.
In Project Discovery, if we include the entire library function as part of the system, we are forced to observe that at traffic levels as low as three per cent, that is with the average classroom using the system only three per cent of the time, the probability of service denial ran in the neighborhood of 30 per cent. This means that although the average class was using the system only three per cent of the time, out of every three requests for a specific film two would be successful and one denied.

In examining several other similar systems, it was found that the one common factor was the very poor grade of service. If the probability of service denial reaches a 30 per cent figure, the system is completely overloaded and it is this that causes the traffic level to stay down. If a system is to be such that it has a very good grade of service (in other words a low probability of denial), then there must be facilities that are going unused much of the time. If the grade of service is one per cent as in the telephone system, so that out of 100 calls only one runs into a shortage of equipment, then 99 per cent of the time, there is some equipment going unused. In the various projects examined, there was considerable evidence of parsimoniousness.

In Project Discovery, the libraries supplied to the test school consisted of some 1000 movie titles. There was only one copy of each title. Had the library consisted of 500 titles, two copies of each, the traffic would have been more than tripled. It was the library that overloaded and so was incapable of retrieving the films that the teachers wanted. This was actually due to the excessive time the films stayed out for each usage. Project Discovery is an example of a system that was not designed with the second half of the first measure in mind, that is, not only must stored human experience be more readily accessible, but the traffic must increase. In effect, Project Discovery made the doors to the library bigger, but didn't manage to get the people moving through them.
In laying out the Information Retrieval Television system for experimental operation in Ottawa, traffic targets were established at the very beginning. Traffic data was included as one of the important parameters which would be measured during the experiment. In this example, it was possible to set up some 120 classrooms with access via a closed circuit television cable to a library of 2000 film titles. Direct telephone connection was provided between the terminals and the library, and films could be ordered at a moment's notice in this way. A superb "telephone book" was prepared and distributed to the system users. Every effort was made to keep the grade of service such that the probability of a blocked call would be no more than ten per cent. The traffic density into the average classroom was calculated to be somewhere between 10 and 15 per cent for this grade of service level.

When the service became available in the fall of 1968, the traffic built very rapidly. As more and more titles were phased into the library, and as the quality of the "telephone book" improved, the anticipated traffic figures were quickly met. Our particular interest here is not the educational value of this system, but rather in the fact that a lot of activity was occurring. The traffic density amongst the users of this system was over 50 times higher than that in normal broadcast educational T.V. systems. No falloff appeared as the novelty of the system wore off, and in fact the traffic volume continued to build steadily through to the end of the school season. The experiment will continue and a full analysis of the educational impact will be made by the Ontario Institute for Studies and Education.

Because of the expense involved in doing an experiment of this kind, it is necessary to bring together a great number of organizations to share the costs. The Ottawa IRTV experiment for example, was achieved through the cooperation of the Ottawa Public School Board, the Ottawa High School Board, the Ontario Institute for Studies in Education, Bell Canada and Northern Electric Laboratories.
As a result of the attendant compromises, it was not possible to structure the experiment as optimally as we might have wished in order to demonstrate thoroughly the significance of the first hypotheses. However, the tremendous increase in material flowing into the classrooms as a result of this system suggests that the system has been successful. We have made stored human experience more readily accessible, and worked hard to build a large traffic base. As a result, the traffic was forthcoming and has stayed at a high level.

The third measure suggests that if a listing were sent out periodically to all the users, showing the most popular selections, the same kind of consensus-forming processes now involved in the selection of popular songs would operate for this system. Such a procedure, done weekly perhaps, would probably build the traffic to an even higher plateau providing the grade of service could still be maintained. In this way, some simple tests to verify the validity of the third measure could be run.

It will be some time before all the results are in from this experiment. The spectacular success of the system would appear to substantiate the premise that to be significant, a communications system should make stored human experience more readily accessible.

In an effort to examine the second parameter, that is that the size of the common information space shared by the communicants should increase, to enable better communications, an experimental system was set up which provided a shared visual space in two locations. Two cathode ray tubes were arranged to present identical pictures of the markings which one would make on the faces of the cathode ray tubes with a wax pencil. In this way, a grid marked out on one tube would show on the second, while the moves in a game of tic-tac-toe made by the second person would appear on the first man's screen properly fitted into his grid. This shared visual space gave a complete duplication at each end of all the markings made by the two individuals using the system.
It was most interesting to observe the excitement of the people who used this system and although the two users were separated by a mere three or four feet, their attention was totally riveted to the on-goings in the common visual space. This is certainly not a scientific proof positive of the value of this parameter, but it does indicate some of the potential that lies in this area. Incidentally, the equipment used in this demonstration was video-phone equipment and could be converted back to that type of operation by merely swinging the units around. Not one user was sufficiently interested in converting back to this more conventional method of operation to do so. This exploratory work was done in connection with the development of a communication service known as "Scribblephone".

The chief objective of this system is to offer both auditory and visual shared information spaces. With Scribblephone, one can write, erase, read, talk and listen simultaneously. This plurality of simultaneous capabilities permits a very rich type of communication game to be played, where the ability to interrupt becomes a very exciting thing. The simulation that was constructed did not have the erase feature, but in the other respects, it measured quite well.

A large computer corporation recently demonstrated a number of graphic terminals on a single time-sharing computer system. The terminals were equipped with an option whose nature permitted inter-terminal graphic communications. Most interest was expressed in operating these units in the terminal-to-terminal mode and so playing in this common visual space. Again, a whole new language of action can be developed in this kind of medium.

Although none of these experimental situations could be construed to be conclusive, they do lend credence to the thesis that if a system rates high in terms of the measures of communications, then the system will be significant.
Years ago, before radio and television, popular songs remained on the hit list for two or three years. Music publishers would print copies and distribute them by a door-to-door sales technique. Then came radio. The whole process was speeded up, and a hit lasted for two months. Music publishers had to establish dealers and ship the printed copies of the top tunes out on consignment. In addition, instead of one or two great songs, there was the "Hit Parade" listing the top ten on a weekly basis. This was the content of a weekly radio program of some considerable fame, broadcast on a coast-to-coast network.

With television, the picture changed again. The printing press was just not fast enough to keep pace with the two-week life of a popular song. Furthermore, the top ten on a national basis was no longer meaningful, and was replaced by the top fifty in each individual area in the country. The music publisher moved into the business of performing rights, and used the printing press only for the slower moving parts of his business, educational and religious music.

The communications speedup that represented a multiplication of 50 to 100 times, brought about a consensus system that was dynamic, very complex, and regional in nature.

National unity, as a musical fact, no longer exists in the popular song sense. Perhaps national unity is equally questionable in other senses. In the world of business and politics, the conventional systems of consensus discovery are organizations that can not match the speed of change characterized by these latterday electronic communications developments.

The above example is intended to show how the consensus forming mechanisms of a society are a function of the communications media at the society's disposal, and how the last two revolutions increased the ease with which a new consensus could be added to the heap of already flying ones. Consider how quickly the "moratorium" for the Vietnam war grew in the fall of 1969. A non-organization was able to develop a significant consensus within the society much more quickly than the organization proper was able to react meaningfully to this particular situation.
Although these validation arguments are anything but conclusive, they are approaching the best that can be put forth at the moment. Two strategies are now open to us: we can go ahead and haltingly use these measures in the making of decisions, and examine the results of such action and, to the extent that such projects are successful, use the technique for larger and larger projects; or, we could spend the next decade researching the validity of the three measures until we have enough courage actually to use the measures in real decisions.

Clearly, a combination of the two approaches is the most valid, and we should use the measures to a limited extent while the research is going on. In this way, the research work and the actual usage can be coupled together, and the significance of each enhanced.

So much for validation of the three measures:

- the ease with which stored human experience is accessed.
- the size of the common information space shared by the communicants.
- the ease with which the host society can discover and develop a new consensus.

MEASURES OF THE FUTURE

Communications is such a wide ranging subject, that when some insight into the subject is achieved, one should expect the effects to be equally wide ranging. In this chapter we shall explore some of the ideas developed earlier in terms of our future.

Lewis Mumford has pointed out that the city is a device for the storing and processing of information. Is this also what communications systems are intended to do? We may in fact be bringing about the "city of wires". Unfortunately,
our brethren who design the "city of bricks" seem to have reached the end of their tether, and maybe the future belongs to this "city of wires" that transcends our current views of a city.

Just as the city is a place that is alive with excitement caused by the interaction between people, ideas and groups, so the communications system we plan must provide the same things. Let those who are concerned with privacy slink off in their corner and do their thing in their own isolation. As Aristotle observed, the man who withdraws from society must be either below the level of man and a kind of beast, or above it and a kind of god. We are designing for neither of these cases.

You will recall that the three measures of communications effectiveness are:

1. The ease with which stored human experience can be accessed.
2. The size of the common information space shared by the communicants.
3. The ease with which the society using the system can discover and develop a plurality of new and fresh consensuses.

Richard L. Meier, sociologist at Berkeley, has pointed out that for a society to experience an absolute increase in wealth, there must be either at that time, or immediately before, a quantum jump in the communications within that society. The task now seems quite simple: design a communications future that conforms adequately with respect to our three measures, and then sit back and harvest the money. Not harvest the money just within the system as a lumber baron might, but harvest it throughout the entire society that interacts within the system. And that is surely a worthy goal.

The city rates fairly well against the first communications measure. In the second measure, the city also measures well, in the ghetto or the neighborhood where individuals come together and mix in many ways and share many experiences in
in a rich and complex pattern. With respect to the third measure, the city also measures quite well, for the concepts of politics are rooted in the city. The city then is a fine device for communications. It is probably due to the fact that we have overlooked the importance of this aspect of the city that we have our current problems with the architectural statements which we now call cities. Clearly, the "city of wires" must be designed to make stored human experience more readily accessible to its inhabitants, must help them to share a larger information space, one with another, and must contribute significantly to the ease with which the citizens can discover, develop and overthrow outdated consensus in a highly pluralistic way. If this is what we mean when we talk about a wired city, then this will be significant. Suffice it to say, that wires alone do not have the necessary and sufficient relation with the goals as outlined above. The danger is that the wires become ends in themselves and the important goals get overlooked.

Information retrieval systems, computer assisted instruction systems, and various other related wonders of the information age, are frequently touted as being the salvation of our communications problems. There are many grave and serious difficulties along this road that will have to be overcome before the systems can be really significant. The problems inherent in language are such that it will be some time before the dreams in these areas are achieved.

If we observe carefully the wording of the first measure, that is making stored human experience more readily accessible, we note that an information retrieval system may not be the only solution. If speed reading really works, then this form of solution is also acceptable. In addition, one cannot help but observe that the symbols employed in our phonetic alphabet today were based on the technology of a stick scratching patterns in the sand. Perhaps now that we have the computer to teach us, we should consider looking at other methods of writing: forms other than the phonetic alphabet, with its stick-tracing patterns-in-the-sand type of symbols.
There are many alternatives to the simple technique of building a large information retrieval system with its attendant dangers of highly structured indexing methods. The name of the game is to make stored human experience more readily accessible, and in doing so, to assure that an increase in traffic results. Whether this is done by teaching the population speed reading, by developing information retrieval systems that browse and thrust before the user the material he is going to be the most pleased with, or whether this material is in the form of phonetic letters or cartoon-like pictures or some other pictographs, or some combination of these, the future alone will tell. There are many opportunities open to us, and the choice of one or two from this set could be the most important decision our society will make.

In the various proposals for electronic newspapers, little seems to have been done in terms of increasing the pluralism of the consensus that can be carried in the newspaper. One proposal was made a number of years ago for a neighbourhood-by-neighbourhood, electronic newspaper system, on an extensive scale throughout an entire city. Such a system would contribute considerably to the development of the individual group's capability of developing and exploring consensus. In this sense, such a system would be a significant achievement. The use of the electronic technology to merely replace the newspaper boy seems rather unimaginative and offers little improvement.

In terms of the three measures of communication system outlined previously, the satellite measures as nothing more than a rather long pole with a microwave antenna on its top.

One might compare the satellite to the horse that carried the Roman Emperor's messages throughout the empire. A very important beast to be sure, but not all that earth shaking. The satellite doesn't even class as a new business in the sense that a truly new business comes into birth without any government reaction. The government knew exactly what to do about satellites and organized hearings all over the country to prove this. Hence, the excitement seems to be related to
something other than the essentials of communications. Perhaps the satellite situation can be more accurately modelled in terms of a territorial game for governments and corporations to play.

Two very large American corporations are currently developing methods to permit a television set to act like a video record player. CBS with their EVR system and RCA with their Selectavision hope to make lightning strike again, and re-create the phonograph record business only in terms of television.

Depending upon the costs for the cartridges and their availability, these systems may make stored human experience more readily available, but how much more so than the book does is debatable. Certainly these systems are no better than the book for the other two measures. Hence, one should conclude that these developments might not revolutionize the world. If there is any truly major significance in these systems, it must lie in the perceptually determined areas of communications values, and so remains to be categorized.

Since the distribution technique used here is essentially that of the book, the major difference is in the sensory impact that the system has on the user directly, and this research study has only just begun.

Some of the newer features that are just beginning to become available in the telephone bear some examination with respect to these measures. The introduction of electronic switching and other attendant changes will permit the addition of a third party to an already established call. Clearly, the calling in of another person to a conversation already in progress will increase the telephone's capability of developing and exploring nascent consensus. In this sense, it could be a very worthwhile contribution and much more valuable to our society according to our three measures, than using the telephone system to read our household water or electric power meters. Differentiation between these simple projects was never before possible in terms other than mere profit and loss.
In this consensus forming area, the gems are small and very rare, and one is thankful for mere crumbs. We know so little about designing communications systems to help us in this consensus-forming game that even the simple concept of adding a third party becomes outstanding. Many of the other features, such as abbreviated dialing and repertory dialing and so forth, merely ease the use of the system. Such features make a very minor contribution to the worth of the system in terms of our three measures.

As we look into the future, it becomes increasingly important to attempt to make our future expenditures in communications capable of motivating us to levels of increased productivity and innovation. This is so that these improvements will, in effect, pay for themselves. The future systems, be they wired cities or Picturephone or universal information retrieval, are so horrendously expensive that, unless these systems have this kind of self-paying characteristic, they make little sense.

Fundamentally, wealth is not created by the simple interchange of goods or even the entrepreneurial activities of man but rather wealth is created by one of two processes: husbandry and invention. Wealth creation, however that be measured, represents a situation where there is something absolutely more in the sum of the "afters" than there was in the sum of the "befores". The transference of paint from a palette to a canvas, by a great master, does in fact represent a form of wealth creation. The development of a new theory in physics also represents an increase in our total knowledge and so an increase in our wealth. In the world of economics, the entrepreneur acts as an enabler rather than as a wealth creator, and enables the invention to achieve its potential. Bell's invention represented the creation of new wealth. His organizing to exploit this invention as an entrepreneur represented his effort to achieve a reward from the development of the wealth-creating potential of his invention.

Because the telephone was a communications type invention, it has a second kind of wealth-creating aspect that is of greater importance than the first or direct kind.
Certainly the telephone, by easing communications, enabled a great many more ideas and inventions to be created and developed by many more people than would otherwise have occurred. It is this aspect of our communications future that we must attempt to optimize.

Whether we measure the increase in wealth as a result of our creating new systems in theories of physics, increases in GNP, or books written: the sum of the "afters" must in fact be absolutely larger than the sum of the "befores".

We observed earlier that every significant increase in the ease with which stored human experience could be accessed was followed by a period of increased productivity in the society. It becomes a time during which the accumulated wealth of the society increased in leaps and bounds. It seems then that it becomes necessary to include in our studies of economics these multiplicative effects of communications. Alternatively, a valid subject in the area of communications would be the economic effects of communications systems on the host society. Again, so little research has been done here that the relationships can only be conjectured.

Essentially, the design of a communications future that does not include considerations of these communications measures could result in a very dissipative waste of capital assets. It would become a capital expenditure which would not significantly affect the capability of the society to generate wealth. The introduction of the iron stirrup into Europe in Charlemagne's time completely changed the economy of Europe. Surely we have learned something about technology and society in the intervening years and can do something really significant with our communications capabilities in the future.

Let us examine what the implications might be, if we were to carry the aims and objectives outlined above a stage further - by examining how users, authors, publishers and so on might interact in a communications system of the future. In searching for a model of how this might operate, we can examine several businesses which are currently operating in this area.
Certainly the book business does represent an information exchange system. However, the book business is perhaps somewhat limited, in that we really have no parallel in the data business to the transaction that results in a pound or so of paper being exchanged as a condition that the information be also exchanged. The financial and material transactions involved in book publishing do not relate to the kinds of things likely to occur in the electronic world.

The music business, on the other hand, does have a closer parallel in the area of performing rights. A transaction occurs each time a particular song is played over a radio or television station. Income is generated for the author, for the copyright holder, and for publisher who directs the disposition of these funds from persons immediately benefitting. The set of transactions involved in this business activity, and the kind of material they are dealing with, is very analogous to the set of transactions that might be envisaged in an information retrieval/computer utility world. Also, the product with which we are dealing, pure information, is very similar. Let us consider how this model might work.

Bearing in mind that a major desire is to cause a communications revolution, as evidenced by heavy traffic in the system, we must think in terms of building a very large and complex system. In this sense, we are talking about a sort of mass medium. A mass medium means mass distribution and dealing with large numbers of users. This also entails dealing with a large number of suppliers and a tremendously large number of interconnections between individual users and suppliers.

As a user, I would expect that my contractual relationship with any of the suppliers, the data or information utility firms, would be similar to my present relationship as a telephone user with other telephone companies throughout the world. Today, if I wish to use a time sharing computer service, I must not only make an arrangement with the local telephone company to obtain a terminal, I must have a specific contract with the particular computer facilities that I wish to use.
In terms of my telephone experience that seems ridiculous. For example, if I wish to phone my mother in Vancouver, do I have to agree to take a hundred dollars worth of service from the Vancouver telephone company before getting one telephone call? This is no way to build traffic. The name of the game is to merchandise the product in a way that will build the traffic to very large levels. Such impediments as individual contracts between each user-supplier pair will inhibit the growth of service more than anything that could be imagined. The relationship between the individual user and the specific computer utility firm which he is using must be in the form of an implied contract.

The local communications company plays the role of a local retailer, whose role is to make the product eminently available. Coca-Cola is totally dependent upon its retailers, who certainly make the product very available. Build traffic. In effect, the communications companies become the "Sears" of the information world, actively promoting the growth of traffic. In comparing the merchandising employed by a mass retailer with the techniques used by a telephone or telegraph company, the present difference in attitude becomes quite obvious. When one tries to buy something, the difference is even further underlined! This must change if these new wonders of communications are really going to work as true mass media.

By having such an agreement between each user and his local communications company, an information system user would have much the same kind of service that now exists for long distant telephone calls. This means that "Direct Program Dialing" and "Automatic Program Accounting" would be the norm. In this way, a customer could try a half hour of General Electric's time sharing system by doing no more than dialing it up. When his bill comes in at the end of the month, there would be an identified amount in that bill for this particular usage, part of which would eventually go to General Electric.

With a full array of suppliers of time sharing systems, retrieval systems, data banks and what else, as well as a large number of users, a rich network of interacting transactions would begin to evolve, one which would help sort out
the effective suppliers from the ineffective ones. This is where the consensus forming characteristics of such a system begin to emerge. Weak suppliers, receiving little return for their efforts, would either have to improve their services or desist. In order to aid in this process, the communications company would supply a sort of a telephone book which would contain the usual "white pages" and an advertising or "purple pages" section as well. In addition, it might be worthwhile to add a section, either in the index book or on the system itself, that indicates the traffic each of the suppliers' programmes is handling. The best way to build popular songs is to tell the world what's popular. It speeds the process, and builds traffic!

Because the system contains elements which make it essentially adaptive to the customer's needs, the risk of a heavy penalty due to equipment failure, short term exploitation and so forth are quite minimized. It is essential that in any overall accounting of the benefits such a system might bring a society, we must assess the disservices that the system might cause as it becomes an indispensable part of our business and social lives. The rich pluralisms within this proposed system are intended to minimize this type of cost.

One very real objective of such a system would be to make authorship easy for the general public. If you wish to write your own computer program and pay for the flat rate storage in the system, you should be free to do this. The reward for a successful program is of course a payment for every usage. Instead of it costing five thousand dollars to publish a book, you could do it for practically no capital outlay, and just a simple flat monthly storage charge. If you can't meet the monthly payment, i.e. if the program doesn't generate sufficient income from its usage to pay for its storage, then out it goes. You can't keep that kind of payment up forever.

In this way, whole new software services could be conceived of as growing up with practically no significant capitalization; this being provided in the system itself.
It would measure quite well in the three measures we have set out, and in many ways is a "city of wires". Much research and development work at a "total systems" level would be required to integrate the currently disparate technologies of transmission, storage, switching and terminal devices. An increase in the co-orientation of behaviour of these separate branches of communications technology is necessary to bring about a harmonious systematization of their fruits. By using the three measures, as a check against each decision made in further development, its usefulness could be even more assured.

The foregoing system model was built as an example of pushing the first measure. In the area of exploring the second measure, it must be observed that a system for literally sharing hands at a distance already exists. The existence of such techniques implies that the age-old goal of the telecommunications engineer to merely approach face-to-face communications is much too restrictive. The facts now state that this boundary is arbitrary and the true situation is essentially open ended. The impact of such techniques tends to have a considerable component rooted in the perceptual portions of our earlier split, and for this reason, we shall pass from extending the second measure on to systems that deal most significantly with the third measure.

Communications systems have, in the past played an important role in helping societies develop their nascent consensuses. The Greek amphitheatre where the citizens met is an example. The technology involved in the acoustic design of this communications system is quite respectable, even by today's standards. Unfortunately the system could not be extended beyond many hundred participants, so limiting the size of the group that could get involved.

The complex problems faced in a large corporation are rather simpler models of the larger issues present in a society. However, in the commercial world, the need for a system to really work is present, and the effectiveness of any consensus discovering system can be measured in terms of how a corporation using the system fares. In trying to utilize
our increased opportunity for creative and individual con-
tribution, we must develop better means of making the overall
effect as satisfactory as when each contributor did his piece
of labour, rather than his piece of invention, as it is now
becoming. Invention is a lot harder to direct than labour!
And this is the main challenge to the kind of system we are
considering here.

One might describe this kind of system as one that would
interact with the members of a particular corporate mini-state
in a meaningful and almost fun-like way, that would so raise
their competences as to permit them to deal with the complexi-
ties of their interrelationships in a more rational and pro-
ductive manner. Within this kind of environment, the tasks
of learning, working and teaching smear into one, and if we
really succeed, we may even dare to add "entertaining" to
this trio! If this is what the wired city of tomorrow is,
then let's get on with it.

The challenge of the future lies not in the development
of technology alone, but in the development of technology that
relates to man. Technology that is his servant and not tech-
nology that becomes his master. A recent book published in
the field of technical illustration used technical drawings
to show examples of current technology compared with the
technology of one or two centuries ago. In every case, the
older pictures showed the technology in perspective with man.
In the newer pictures, man if observed at all, was clearly
subservient to the machine.

Allen Ginsberg in his poem, "Telephone", and Gian-
Carlo Menotti in his opera, "The Telephone", written in
1946, both chronicle annoyances associated with the telephone.
Such a response to technology is interesting in that it is
indicative of a more critical relationship between man and
his technologies. Our future planning must take this shift
into account if the results of the planning are to be rele-
vant.

The future of communications means more than the mere
development of error correcting codes, data links with suf-
ficiently low error rate, increased channel capacities, a PCM
network, and other hardware oriented goals. These mechanistic goals could well be our fate. They require little consensus effort in order to produce the co-orientation of behaviour necessary to bring them into being. The more complex goals, such as those inherent in our three measures, require the expenditure of much more effort before sufficient co-orientation of behaviour is achieved. This will lead to the development of a system that rates significantly in these man-oriented communications measures.

Unfortunately, in order to move towards these more abstract and complex goals, we really need an improved technique for developing consensus. In effect, the lack of a suitable communications system limits our ability to design one! Such is our dilemma. If we realized we needed this system to an extent to cause us to produce it, we really wouldn't need it quite so much. Our corporate lack of this specific realization is, in effect, a proof of our need.

Can the communications industry generate the consensus necessary to achieve these more abstract and complex goals or be satisfied with the simpler and more hardware-oriented ones? Can it be allowed to make this decision on behalf of the society at large? Can this book help develop a consensus in our society in this area? Which will it be, Moloch (needless sacrifice) or Aquarius (love and mental achievement)?
In this study I start by asking some embarrassing questions on the scope of urban problems, questions we are not quite able to answer.

I then suggest that this inability stems, in part, from the growth of urbanization to the point where, going beyond localism and regionalism, we are becoming a Nation City.

This, in turn, is part of a painful social revolution which, without political revolution, has replaced the old industrial order with a new and confusing service society. The transformation is accompanied by an exponential growth in ignorance and sin and a break down of older values, myths and models.

While this study deals somewhat less with "societal accounting" than my *The State of the Nation* or *The City of Man*, it exhibits the same "curious bifurcation" that Daniel Bell noted in the former document. After spending much of my time on the high clouds of complex or historical abstraction, I then descend to such mundane matters as data, indicators, and the outmoded concepts on which many of them may be based.

Some Embarrassing Questions

What are Urban Studies?

"Do you have a subject?"

This embarrassing question was recently put to the directors of most of the active urban study centers in North American universities.

Distinguished Professor of Urban Affairs and Planning
Department of Urban Affairs
Hunter College, New York
Like jesting Pilate in Bacon's essay Of Truth, the questioner waited not for an answer. But the question was neither jesting nor rhetorical. To the questioner, William R. Keast, President of Wayne State University, it was much more pressing than such academic discussion stoppers as "What Is Political Science?" To Keast's audience, it was laden with subtle implications for both intra- and extra-university politics. With scores of new urban affairs programs on the drawing boards or about to begin operations, the question is of immediate importance to students, faculty, administrators and urban policy makers throughout America and Canada.

A few informal replies were voiced at the conference. "Urban Studies," said a political scientist who had been in the business longer than most of his colleagues, "are policy studies. We call them urban to provide a little more focus and a lot more attention. An economist suggested that formalizing urban studies helped get marginal increments of funds from foundations and government agencies. A sociologist went on record that the explicit subject matter was less important than their latent function: "the partial protection they provide for most of the rest of the university against some of the most salient pressures for institutional change resulting from continuing urbanization and the new forms of urbanism." Others explored the various permutations of urban education, urban research and community activities that various universities were offering in response to pressures. Efforts to delimit these activities by identifying the non-urban stumbled against the hard fact that rural poverty and agricultural mechanization are often--and with good reason--included within urban studies.
What is the Urban Crisis?

A still more troublesome question is "Just what is the urban crisis"? We live in an age in which the standard way of crying "wolf" is proclaiming "crisis." As a group of astute commentators have pointed out in an excellent set of readings, Metropolis in Crisis: "From the highest levels of government to the blighted ghettos of our central cities, the concept crisis has become commonplace in our discussion of the urban condition....The end of war, poverty and injustice appear for the first time to be within man's grasp. Perhaps we cry crisis because the pace at which we are moving toward the accomplishment of these lofty goals is slow when compared with human expectations. But if crisis is an appropriate word to use at all, it seems to us appropriate to apply it to the city. The city is not only the locus in which many human crises are occurring, but the very process of urbanization and man's response to this crisis constitute the fundamental background which has produced crisis." 5

The editors of Metropolis in Crisis then proceed to list the indicators of crisis in their own city of Cleveland. They refer to racism, pollution, the failures of urban renewal, and Cleveland's desperate financial situation. In the various chapters that follow they provide readings that broaden the scope immeasurably. While the racial crisis still heads the list of "Dimensions of the Crisis," we now find that the urban crisis includes housing, poverty, education, crime, transportation, health, employment and unemployment. These subjects, in turn, lead us to other crises relating to the distribution of power, the reform and reorganization of local government, and intergovernmental relations.

What, one cannot help asking, is not involved in the urban crisis? Are there no limits?

In seeking limits, the directors at the urban study center conference started out by suggesting "Domestic policy, Yes--foreign policy, No." But after more serious reflection, they found themselves touching on military and foreign policy. As
illustrated by the debate on the placement of anti-ballistic missiles (which broke out during the conference), military policy is increasingly involved with urban areas as objects of attack or defense. Expanding armaments, as the directors pointed out in joint statement of personal views, divert resources from possible urban uses. In a much more direct fashion many of them agreed on the desirability of international urban studies (developed earlier at Cornell and expanded at Wayne State University under the leadership of Jack C. Fisher), now on the way to becoming a vital part of international studies.

What is Urban?

Behind any questions on the content of urban studies and the scope of the urban crisis lurks the more fundamental—and deceptively simple—query: "What do we mean by urban?"

This matter cannot be settled merely by turning to the official bodies that compile statistics on urban areas. The U.S. Census Bureau has jumped from one arbitrary definition to another. The statisticians at the United Nations include as urban whatever different meaning any member nation assigns to the term. Serious analysts now look at urban regions which include large numbers of people in areas officially described for statistical purposes as rural-nonagricultural and often referred to as the rural-urban fringe or interurbia.

At the heart of all such definitions is the phenomenon of population proximity. Traditionally, this has been measured in terms of the concentration of the resident population within a given boundary line. In both pre-industrial and industrial cities this coming together of large numbers of residents has been associated with other more complex phenomena that are regarded as urban: e.g., specialization of labor, market places, large-scale organizations, the seat of power (military, religious, financial, commercial, and administrative), artistic and cultural activities, the influx and outflux of large numbers of non-residents, and the growth of a cosmopolitan rather than place-confined culture.
To measure the growth of any urban area, three remarkably difficult problems must be faced: (1) "How to draw the boundary line?" (2) "Within a boundary line, which people to count?" and (3) "How to measure population concentration?"

The easiest approach to boundary lines is to use political subdivisions. This means including all cities as urban, plus all towns or townships over a certain minimum number of full-year residents. As residential population extends beyond these political boundaries, measures of integration with the city are used. In the United States the entire area and population of a county next to a city is included within the city's metropolitan area if certain criteria are met. These criteria relate to the location of employment of county residents, the location of residence of non-resident workers, and the further integration of county residents into the city through the telephone, the press, shopping, transportation and metropolitan civic activity.

Here the most obvious problem is that the significance of any fixed boundary line is diminished by the expansion of concentrated residence beyond the boundary and by major changes in the location of employment and the entire fabric of integration and non-integration. Thus analysts are always unsatisfied with the previous set of boundaries and are busy at work developing different sets of boundaries for different purposes. This has led to a long series (of which we may have seen only the beginning) of boundary definitions: Standard Metropolitan Statistical Areas, Standard Consolidated Areas, State Economic Areas, regions, etc. The problem is complicated by the rapid growth (not yet analyzed in the literature of urban studies) of intra-urban boundaries. Some of these are political districts established by State or local laws: Congressional districts, State senatorial and assembly districts, and municipal wards or boroughs. A much larger number is administrative in nature—as with ZIP code zones, the special districts set up by school boards, police departments, fire departments and the many new programs in the areas of urban renewal, anti-poverty, "model cities" and community participation. Still other districts are analytical in nature, established by special
research organizations or planning groups. These include census county divisions, census tracts, city blocks, central business districts, central function areas, "critical areas" within a metropolitan area, or the extended regional areas often used by councils of governments, regional planning groups and market research organizations.

The easiest approach to counting people within any boundary is to count residents only. This approach was more relevant in the 19th Century when much more of man's activities took place near his home. Today, when people range far from their home for many purposes (work, education, shopping, business, leisure, etc.) the information on resident population may be highly misleading. Very few people "live" (that is, sleep) in Wall Street, in central business districts, or the immediate areas of commuting universities. In these districts the residential population may remain static or go down, while day-time, week-day population congestion (and land values) may rise rapidly. Yet only a small beginning has yet been made in tracing people-to-area ratios (as distinguished from simplistic resident-to-area ratios) within urban areas as they change from one period of time to another and affect the use of local services and the texture of urban cultures.

The easiest approach to measuring population concentration is to look at relationships within a given boundary line. This approach tells us, for example, that in 1960 the average resident population per square mile in New York City was close to 25,000, Chicago 16,000, Los Angeles 5,000, Philadelphia 16,000 and Detroit 12,000. Within any city the differences are usually enormous, with high density land use sometimes facilitating large amounts of dwelling space per person (as in high-rise luxury apartments) and low density land often occupied by densely-crowded dwellings. The suburban areas are usually characterized by much lower densities per square mile, per building lot and per dwelling and room.

A new dimension of urbanism is revealed, however, if we look outside a given boundary as well. Thus both Tulsa, Oklahoma, and Akron, Ohio, have about 5,400 residents per square mile in 1960. But the residents of Tulsa are geographically isolated in comparison with those of Akron, who can
"rub shoulders" with the residents of Cleveland, Youngstown and other close-by urban centers. Brian Berry at the University of Chicago and other geographers have started to cope with such facts by developing a new measure of proximity (technically referred to as "population potential" in accordance with a distance-mass ratio borrowed from physics). Such measures have thus far been calculated, however, only in terms of miles. When proximity is measured in terms of transportation time and then in terms of communication as well as transportation, new concepts of "urban" will emerge.

With such concepts in mind, we can be in a better position to peer into the future and formulate the future-oriented quest that may prove still more embarrassing than those in the present tense:

--What future urban crises loom ahead?
--What kinds of urban goals may be formulated?
--What kinds of urban studies may be relevant in the future?

Where is Anthropolis?

In trying to cope with these questions it is helpful to start with three findings by Melvin Webber, plus a vigorous dissent that takes us in one quick leap from urban areas to the country as a whole.

The first finding, given widespread lip-service among modern urbanists, is that "despite all the recent work on urbanism we still do not have even an inadequate description of the urban system's structure." Lacking structural knowledge, in my judgement, we cannot readily describe the performance or environmental relations of the system or its parts. Lacking descriptive starting points, we cannot readily achieve understanding, prediction or control. Nor is much comfort provided by Kenneth J. Schlager's frank but upsetting rule-of-thumb that "given the fantastic complexity of the modern metropolis, it is much easier to tell people what they should do than to explain what they are doing."
The second, even more supported, is that we should view human settlements not as "closed mechanical systems of buildings, utility lines and roads" but rather as "aspects of societal systems." As I see it, a societal system is neither a machine system that excludes people nor a social system seen without the things that people make or use. It is rather a people-thing, man-resource or "socio-technical" system. Since man and the extensions of man are at the center of the system, and since such words as metropolis and megalopolis refer mainly to size and numbers, perhaps we need a new word to dramatize the human element. Such a word is anthropolis. We also need a more formal definition of any anthropitan settlement: an aggregation in space-time of individuals, families and other social groupings, together with the non-human resources—natural, man-changed or man-made—separately or collectively used by them.

The third is that "among the most valuable things we can do is just to supply better information about the current states of affairs in various urban subsystems." Webber concretizes this view with a discussion of urban intelligence centers that might inject "scientific morality" into the necessarily political processes of local planning.

This idea naturally is strongly supported by those with a vested interest in the production or processing of information and by those with some capability of using the information provided.

The dissent is very simple: namely, that to describe an urban structure, analyze the urban aspects of a societal system, or provide better information in urban areas, we must start by looking at the national society as a whole. We cannot find the keys to anthropolis on Main Street. Urban studies are national studies, urban crises national crises, and urbanism a national phenomenon.

Up to a certain point, urban planners recognize that an urban area is an integral part of the national society. Eldredge puts it this way: "In the open system of the city with massive input variables of central government policy, how can anyone 'plan' adequately at the local level?........City
plans depend on national plans, both spatial and functional, programmed and budgeted through time. Urbanization is too complex and too extended to be managed at the micro-level.10 And again: "Societal scale is far beyond the city today; regional, national and international plans are in order."11 Webber himself stresses the necessity of looking at all levels for "the overlaps and interdependencies among the various public and private governments that collaborate in urban development."12 Similarly, Brian Berry, the urban geographer discusses the city as a system in a system of cities.13 Wilbur Thompson, America’s leading urban economist, relates urban income, growth and stability to a nation-wide process through which new industries "filter down" from the larger to the smaller cities and rural areas.14

But this is much less than looking at American society as a background for studying an urban area or at urban areas in the perspective of a changing national society. It is a specialized approach that concentrates on tracing various threads from the local to the national level, particularly those that might lead to local funds from nation-wide organizations. This specialization is valuable, especially when funds are forthcoming. But it is not sufficient to illuminate our present, let alone our future, urban crises. We must have the courage and patience to consider the possibility that our urban problems are systemic symptoms of national disorders and can be diagnosed only by examining our entire society.

In this connection, it may be pointed out that the definition of a human settlement, as presented above, suffers from no limitations to any particular part of a map. As a general systems concept, it can be applied not only to Detroit or its central functions district, but also to the United States as a whole or human settlement on this planet. Its use in studying any particular configuration of population concentration may be made in terms of the concepts presented in the previous section on the drawing of boundaries, the counting of people and the measurement of density and proximity.
The Nation City

As already indicated, the growth of urban areas in the United States—as well as in many other countries—has been so extensive as to rupture, one after the other, almost every new definition devised by statisticians.

We are now entering a new phase of urban extension, one that can be only partly reflected in present statistical measures. The partial measures that we have indicate the growth of vast megalopolitan clusters that exercise hegemony over the so-called "non-urban places," a deep fragmentation within all metropolitan and megalopolitan areas and the growth of transurbanism. All this suggests that in many ways the entire country is becoming a Nation City. It may take at least a decade before we can adequately understand the interrelationships among social groupings in the many neighborhoods of this new Nation City. Any serious progress in this direction, as previsioned by the work of Brian Berry and Stuart Chapin, will require socio-spatial analysis on a national scale.15

Metropolitan Clusters in Megalopolitan Hierarchies

"The Northeastern seaboard of the United States is today the site of a remarkable development—an almost continuous stretch of urban and suburban areas from southern New Hampshire to northern Virginia and from the Atlantic shore to the Appalachian foothills. No other section of the United States has such a large concentration of population, with such a high average density, spread over such a large area... Here has been developed a kind of supremacy, in politics, in economics, and possibly even in cultural activities, seldom before attained by an area of this size."16

Thus wrote Jean Gottman in 1961, calling this area by the name of an ancient Greek town that never lived up to the size of its name, Megalopolis. Six years later, in the course of applying Gottman's concept to the entire world, a group of Greek scholars came to this conclusion:
"The second third of our century will probably be regarded as an important period in the history of the evolution of human settlements since it saw, for the first time, the emergence of a new type of settlement, the Megalopolis. This new type of settlement seems to be characterized not only by its large size in area and population, its high densities, the inclusion in it of several large centers strongly interacting with each other and with the surrounding region, but also introducing new and more complex patterns of life. .." 17

Using a variety of measures, they found 15 megalopolises through the world, 3 of them in the United States.

In his pioneering work on the Northeastern megalopolis, Gottman recognized in general terms its poly-nuclear structure. But he did not go very far in defining it. The components seem to be nothing but cities and metropolitan areas.

It is essential in my judgment to recognize an intermediate component between the metropolis on the one hand and the megalopolis on the other: the metropolitan cluster. Thus the two metropolitan areas of Baltimore and Washington, D.C., are something more than separate entities. The same is true of Detroit and Toledo, Cleveland and Youngstown, and--on a still larger scale--the metropolitan areas of New York, Newark and Jersey City.

If we take all metropolitan areas with a population of more than a million, we find that they have already merged into 20 clusters with a resident population of 80.3 million in 1960 (Table 1 at end). This leaves about 32 million metropolitan population elsewhere--part in single, unclustered metropolitan areas (of which Atlanta is the largest), part in what might be called mini-clusters. Minneapolis and Kansas City are regarded as clusters because they are "twin cities," even though each one is formally defined as a single metropolitan area.
In 1961, although concentrating on the northeastern seaboard, Gottman recognized that "the industrialized Midwest, between the Great Lakes and the Ohio River, and the California seaboard form two other smaller but nonetheless impressive concentrations of riches, economic equipment and educated people." It is now imperative to follow through more carefully on Gottman's insight. In so doing, it is more meaningful to start with metropolitan clusters.

A preliminary mapping of metropolitan clusters reveals the following pattern (See Table 2 at end):

<table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>14.8</td>
<td>Chicago</td>
<td>8.5</td>
<td>Los Angeles</td>
<td>9.0</td>
</tr>
<tr>
<td>Phila.</td>
<td>6.8</td>
<td>Detroit</td>
<td>5.9</td>
<td>San Francisco</td>
<td>4.2</td>
</tr>
<tr>
<td>Boston</td>
<td>5.2</td>
<td>Cleveland</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td>3.9</td>
<td>Pittsburgh</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartford</td>
<td>1.9</td>
<td>Cincinnati</td>
<td>2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32.6</td>
<td>23.4</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Together, these give us a total resident population of 69.2 million, about 39 per cent of the national total for 1960.

It must be recognized that the northeastern megalopolitan area is far more highly developed. The other two are probably still in the process of formation. In 1960 the midwest region was still divided into at least 4, if not 5, metropolitan clusters. By 1965, according to Doxiadis, the juncture between the Chicago and Detroit areas took place. In his study for the Detroit Edison Company, Doxiadis outlined the boundaries of a Great Lakes Megalopolis not yet joined with the Cincinnati cluster but with a "Canadian extension" and a "Mohawk bridge" (Buffalo-Rochester-Syracuse) to the eastern megalopolis. Similarly the full juncture of the two Western clusters is not yet completed. Some people have even predicted--a little rashly--a continuous urban region from Puget Sound to San Diego.
Using somewhat similar boundaries Herman Kahn and Anthony J. Wiener have conjectured future population growth along such lines as these:

<table>
<thead>
<tr>
<th>Region</th>
<th>1960 (millions)</th>
<th>2000 (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast megalopolis</td>
<td>32.6</td>
<td>80</td>
</tr>
<tr>
<td>Midwest megalopolis</td>
<td>23.4</td>
<td>40</td>
</tr>
<tr>
<td>Western megalopolis</td>
<td>13.2</td>
<td>20</td>
</tr>
</tbody>
</table>

In terms based far more on the past and present than the future, they have also suggested that the distinctive cultures of these three areas could be described—respectively—as "cosmopolitan," "Bible belt, with raw and lusty vitality," and "an informal barbecue culture" with "wholesome degeneracy." 21

The growth of these three areas has a major effect on the growth of all other areas of the country. The more they expand, the less opportunity for other areas to expand their resident population. This may be a blessing for these other areas. In any case, it is unlikely that any other regions of such a size could develop in any other parts of the country. A few mini-megs are possible, however, notably in Florida and on the Texas-Louisiana coast of the Gulf of Mexico.

**Fragmentation**

In purely spatial terms urban planners have discovered various physical patterns in our large urban agglomerations. According to Bollens and Schmandt, "those most commonly referred to are concentric zones, sectors, star-shaped configurations and multiple nuclei. . . . One or the other may be more dominant or noticeable in individual areas, but generally speaking the pattern will embody characteristics of each." 22

In terms of social structure, however, the modern American urban region seems to be patterned on the governing principle of the first truly high-density development in recorded history, the Tower of Babel. That principle, it is recorded, was
fragmentation; the project was dropped in the middle because even the builders could not communicate with each other. Here the governing principle is also fragmentation, fragmentation that has developed along governmental, ethnic, income and familial lines. Although each of these forms of fragmentation has been partially documented by social scientists, each of them has tended to be underestimated.

The fragmentation of urban government has traditionally been discussed in terms of central governing bodies at the local level. Thus in the 212 SMSA's (Standard Metropolitan Statistical Areas) there are more than 18,000 local governments: counties, municipalities, townships, school boards (often declining in number through consolidation), and special-purpose districts (usually rising in number through proliferation). On the average, this adds up to 87 local governments for each SMSA, about 300 local governments for each of the 24 SMSA's with more than a million residents apiece, and about 1400 for the Greater New York Region, as widely advertised in the title and contents of Robert Wood's book, 1400 Governments.

This approach represents a serious oversimplification, one based on a curious myopia with respect to governmental proliferation. Within every significant local government area there are also a large variety of non-local government agencies, that is, field or regional offices (and in some cases, head offices) of State and Federal agencies. Many of these are more influential in local affairs than the agencies of local government. Sometimes they even have more employees—as in California, where for every 4 local employees (excluding teachers) there are more than 5 State or Federal employees. To appreciate the extent of fragmentation in urban government, we must abandon our myopic concentration on local governments and recognize, instead, the reality of governments (Federal, State and Local) operating at the local level.

A still deeper form of urban fragmentation is racial in nature. Here there are many indicators to show or suggest that
-- the black population in large central cities is rising
while large numbers of white people move to the suburbs,
-- residential segregation is rising in many areas with a
  corresponding increase in educational segregation in
  urban public schools,
-- despite greater expectations of equal treatment in the
  job market, educational attainment by Black people
  "may simply mean exposure to more severe and visible
discrimination than is experienced by the dropout or
  the unschooled." 23
-- a far greater proportion of Black people are victimized
  by homicide, rape, robbery, burglary and auto theft, and
  stay home at night because they are afraid of going out. 24

There are much less conclusive indicators on the changing patterns
of racial violence. Morris Janowitz has identified three phases:
(1) "'communal riots' of the World War I period at the boundaries
of expanding black neighborhoods, (2) "'commodity riots,'" with
large-scale looting in the period after World War II, reaching
their peak in 1964-67; and (3) more recently, "'a new form of
racial violence, a more selective, terroristic use of force with
political overtones, again mainly against whites, by small organi-
zized groups of blacks.'" 25 Both this classification and the data
that can readily be assembled ignore other factors that suggest
greater depths of urban fragmentation: the heritage of a pre-
vious era of open lynching, unreported police brutality against
Black people, public school disturbances that are only partially
reported in the press, deep Black resentments that are expressed
not in open protest, but (as Fanon has indicated in The Wretched
of the Earth) in feelings of inferiority, self-hatred, and what
might be called socio-somatic physical and mental illness.

The growth of racial controversy has helped to bring into
the open—and probably accentuate—other forms of fragmentation
along ethnic lines. They myth of the urban area as a great
"melting pot" has now been exposed. On the one hand, ethnic
heterogeneity is still very much a part of the urban scene. On
the other hand, the idea of melting people down and making them
over into the image of the earlier settlers is now increasingly
seen as an attempt at cultural domination by White Anglo-Saxon
Protestant elites.
But in my judgment there is a form of urban breakdown far more widespread, more deep and more threatening than anything in the field of governmental, racial or ethnic fragmentation. I am referring to family fragmentation in the form of both the generation gap and husband-wife uncouplings.

Although there has always been a generation gap, there are reasons to believe it has grown as, in the words of Toward a Social Report, "many of the functions of the family are performed by other institutions, from the Social Security Administration to the school. Thus, young but unmarried adults have had less family affiliation in recent times than in earlier periods. For many Americans now between 18 and 22, the college or university is in loco parentis. For some others a hippie community may play the role the extended family served in earlier periods. Neither the college nor the communities of drop-outs bring different generations together on the intimate terms the extended family once did, nor do they provide the same kind of emotional security or support." 26

Statistics on divorce, separation, legitimacy and so-called "female-headed families," deal with only the more superficial forms of family breakdown. Far more significant is the breakdown in the nature of inter-personal relationships among husbands and wives who remain married, but become psychologically uncoupled. On the one hand, there is a pronounced tendency for husbands to become rather totally involved outside the house, with only the most superficial attention to family management. On the other hand, in a society where monetary values are important, the wife's non-paid activities in the management of the household are continuously and seriously depreciated. At the same time, with great increases in the educational attainments of women, there have been major lags in the growth of female participation in professional, managerial, technical and academic employment (outside of the traditionally female-dominated fields of elementary school instruction and nursing). The well-documented tendency of some women to engage in "mental castration" of men may be paralleled--and partially caused--by the "mental hysterectomy" of women in a world dominated (outside the family) by male values.
Transurbanism

Another special kind of fragmentation is a growing gap between the "locals" and the "cosmopolitans." As Melvin and Carolyn Webber have pointed out, "very large numbers of central-city and some suburban residents follow styles of life and adhere to systems of values that are in many respects unchanged from those that were brought over from the European peasant villages several generations ago. . . the "urban villagers live out their lives in territorially bounded and territorially perceived societies." On the other hand, the social organization of "cosmopolite groups is being largely freed from the restraints of territorial place." 27 This latter trend may not yet have reached the extreme situation envisioned by Jack C. Fisher as he contrasts American with East European neighborhoods: "that the neighborhood, particularly as a social entity, is dead in the United States." 28 But it is very likely that in the most heavily-populated parts of the United States deep attachments to neighborhood, community, city or even metropolitan area are dying. In less pejorative terms this tendency may be described as transurbanism.

Three of the most important factors in the growth of transurbanism have been mobility, communication and nation-wide social organization. Let us look briefly at each.

Americans have traditionally been a mobile people. But in the past 20 years this mobility has reached hitherto unprecedented proportions. Over-all migration rates tell part of the story. They show that about 9% of all Americans moved from the State of their birth during both the 1940-50 decade and the 1950-60 decade. This represented a restoration of the rate reached during the pre- and post-Civil War period. We may also note the large number of moving around within urban areas. We may note the large gains in the relative population of the West Coast, with corresponding declines in other areas. Probably much more significant, has been the vast migration of Negroes from Southern farms to Southern cities, from the South to the North, and considerable "backwash" to the South and the farm. As already noted, the Black population has therefore been rapidly growing in most central cities of the North--particularly in central city slums--and this has meant rapid
increases in the proportion of Black children attending segregated schools. Moreover, the migration rates among "professional, technical and kindred workers" are almost twice as high as that for all employed people. As a result, some of the most able people in the country have been unable to develop enough local roots to develop much interest in—or take much part in—local public affairs. In both cases, with present voter registration requirements, the result is disenfranchisement of an important part of the population.

Apart from changes in residence, mobility is growing in many other ways also. The time spent in commuting, shopping and touring takes many hours of America's time budget. But with present transportation facilities what is much more remarkable is the amount of space that can be covered. A map prepared at the University of Chicago is blacked-in for all areas of the country with daily commuting to a metropolitan area in 1960; the blacked-in area covers almost the entire Eastern half of the country. An almost equally extensive coverage is shown on a companion map showing the extensive areas with commuting to more than one metropolis. The data on international travel, and automobile touring and vacationing and Americans living or studying abroad (including the military) show huge forward leaps away from confinement within narrow territorial boundaries.

Modern communication facilities—particularly TV and radio, but also the press, magazines and books—have also been knitting the country together, far more than residential mobility or personal travel. "Technopolitan man," writes Harvey Cox, "sits at a vast and immensely complicated switchboard. He is homo symbolicus, man the communicator, and the metropolis is a massive network of communications. A whole world of possibilities for communication lies within his reach. The contemporary urban region represents an ingenious device for vastly enlarging the scope of human communication and widening the scope of individual choice. . ." Indeed, metropolitan and megalopolitan areas provide opportunities for men, women and children—in the privacy of the individual family—to be in touch with the entire world, and even the moon!
In the near future a more advanced technology will someday render obsolete many of the advantages of the spatial proximity provided by urban concentration. Low-cost, universally-available, closed-circuit television will soon make it possible to have "face-to-face" communication with anyone, or any willing group, in a matter of seconds. Low-cost rocket transport and vertical take-off and landing aircraft (both large-scale and individual) will make it possible to get anywhere in the world, or move things anywhere, in remarkably short periods of time. Together, these developments may drastically counteract present tendencies toward the concentration of resident population.

Finally, we come to the transurban nature of major subsystems, within urban regions. Any territorial entity is an aggregation of other social systems—individuals, groups and formal organizations. From the village, local community and neighborhood, we move on to the larger entities comprised by towns, cities and urban regions. The implication of transurbanism for the smaller entities is found in the fact that they tend to be remote-controlled. Their major local organizations are relatively weak. Their strongest organizations are usually local branches of far-flung corporations or government agencies, branches governed by a considerable amount of absentee decision-making. In contrast, the larger metropolitan clusters contain the head offices of the most powerful organizations. Thus 20 metropolitan clusters contain the head offices of 83 per cent of the 750 largest industrial and non-industrial corporations (See Table 2). The bulk of these are in Normeg and Midmeg, with the number in Westmeg steadily rising.

But head office decisions in these huge urban regions are not made with primary reference to the individual region or any part of it. Both the corporations and the government agencies in these areas approach decision-making with a much broader geographical perspective. Their frame of reference is the nation and large parts of the entire world. The aggregation of these ships that pass in the night, this localized intertwining of nonlocalized systems, this overlapping within certain urban boundaries of transurban entities—all this gives us a major movement from the remote-controlled small town to the fragmented metropolitan or megalopolitan area and the fragmented Nation City.
The Agony of Societal Transformation

National leaders often hark back to the American Revolution of 1776. As that event's 200th anniversary approaches, together with the elections in 1976 and intervening years, we can expect to hear more about life, liberty and the pursuit of happiness.

Our students of "developing nations" tell us about the revolution of rising expectations in the transitional societies of Africa, Asia, the Middle East and Latin America.

Our domestic commentators tell us about many separate explosions or revolutions at home--Black, urban, scientific, technological. They gleefully project many of these changes--particularly the technological--to the year 2000 or beyond.

But all this can be a way of ignoring the status quo, the changing state at which we are. It can totally miss the probability that all the separate changes in America are part of a systemic change: a profound and painful transformation from advanced industrialism to a post-industrial, science-based Service Society. In the judgment of some commentators, myself included, this is a revolution more complex than 1776 and more disconcerting than those in developing nations.

The greatest agony of this unproclaimed American revolution is not the riots and the violence of urban life. It is not the financial crisis, nor the congestion nor the pollution, nor the fragmentation of government, nor even the generation gap. It is not even the bloodshed of our undeclared war in Asia. It is the gnawing uncertainty that we endure at home and have created elsewhere. We are uncertain as to where we are, where we are going, who we are and who we might become....
This agonizing uncertainty, I shall suggest, is rooted in an unprecedented acceleration of societal change, a disconcerting disparity between social and political revolution, an exponential growth of certified ignorance and a fragmentation of values that is converting the Nation City into the City of Sin.

The Acceleration of Societal Change

"In a well-defined habitat, like a rain forest or pond," Sir Geoffrey Vickers has pointed out in his classic, The Art of Judgment," the densities, distribution and mutual relations of the creatures which inhabit it tend to assume a stable form; and, if disturbed by some change in the environment, they soon assume some other form, equally stable. ..

"Until recent times, the addition of humans to the other animal species in such a field made no substantial difference to the picture. Humans have long shared the Amazonian jungle with its other fauna without disturbing its ecological balance. 31

About a half million years ago, it has been estimated man emerged as a special kind of predatory animal. Life was one of hunting and gathering, taking food and drink from the environment and making only a few tools that helped in the process. After countless centuries a slow societal transformation took place, the first great revolution in man's history and one that in some parts of the world changed the ecological balance: the growth of pastoralism based on hegemony over domesticated animals. With nomadic searches for better forage, pastoral tribes often took more than land from others: animals, wives, slaves and tools. About 20,000 years ago, a second great revolution took place: the emergence of stone age agriculture. During these three periods--predatory, pastoral and early agricultural--people dwelt in caves, tree tops, rude shelters and, later on, small villages.

The next great revolution took place five or six thousand years ago in the Mesopotamian, Nile and Indus valleys as the pre-industrial city--one of the greatest social inventions in history--ushered in the advanced agricultural society. This
was the first "urban transformation" recorded vividly by Gordon Childe, Lewis Mumford and Gideon Sjoberg. Such cities as Eridu and Ur, Memphis and Thebes, Harappa and Mohendro-Daro, were communities of substantial size and population density that included a variety of non-agricultural specialists: artisans, workmen, soldiers, priests and a literary elite. These non-agricultural specialists made possible—and lived off—a growing agricultural surplus. Their City States became the innovating centers, kingpins and citadels of larger agricultural, mineral and pastoral regions. Through colonization and conquest they built empires. Many of the imperial cities still stand—Athens, Rome, Byzantium (now Istanbul) and Peking.32

The Industrial Revolution came much more quickly than its predecessors. It emerged in the middle of the 18th century—although rooted in the innovating dynamism of the Renaissance, the Protestant ethic of the Reformation, the scientific spirit of the Enlightenment and centuries of artisan invention and painful nation-building. This involved an increase in agricultural productivity with a sharp absolute and relative decline in the number of people working in agriculture." The old order was suddenly broken in pieces by the mighty blows of the steam engine and the power loom, the spinning machines, the improved roads, domestic and foreign trade and The Wealth of Nations... Population was torn up by the roots and, like industry, was dragged from cottages in distant valleys into factories and cities."33 The twin social inventions of this period were the factory and the industrial city. Together, they provided the necessary setting for the accelerating growth of modern technology and complex organization.

Looking backward on this series of cumulative changes, we can see that man is still a predator who, not fully adjusted to pastoral or agricultural life, has still not been able to accept the realities of industrialism. It is in this sense that Vickers describes our present state as "the last stage in a free fall—the fall from the agricultural into the industrial epoch; and so into an increasingly political world, a world so unpredictable that it demands to be regulated, nationally, and internationally, by political decisions of increasing scope." We are reaching the end of free fall, Sir Geoffrey suggests, and must soon get "some parachute operation to brake the abruptness of the change...." 34
The Vickers description is a characteristically British understatement. It totally ignores the present nature of free fall. We have already fallen from the industrial to the service epoch. This new epoch, which began shortly after World War II, is one in which there has been an unprecedented increase in material goods (both agricultural and industrial), a decline in the proportion of people producing such goods, and a vast increase in the number and proportion of people providing various kinds of services. The old industrial order has been suddenly broken in pieces by the mighty blows of the computer, automation, world-wide communications networks, supersonic and outer-space flight, new potentialities for saving life and all-too-believable capacities for destroying it. The population has been caught up in a vast surge toward some form of sub-, para-, quasi-, full- or super-professionalism in every walk of life. This extended professionalism is rooted in galloping specialization, university-based credentialism and elaborate networks of formal associations and "informal colleges." The twin social inventions of this period have been

1. the "organizational complex" (not only military-industrial-scientific, but also automobile-highway-petroleum, education, communications and banking) as the framework of private-public enterprise rather than the single giant enterprise, and

2. the "metropolitan cluster" or megalopolis as the classic form of post-industrial city.

Together, they have given rise to the new ambiguity and uncertainty of fragmentation and diffused responsibility. In neither the organizational complex nor the megalopolis can the request "Take me to your leader" be honored; no one knows his name. In both, the ancient territorial imperatives of local community have been broken down. The name of the game may be the same, but the game itself, and all the old rules, has changed. . . .
In the long course of man's societal transformations the values attached to the roles of Hunter, Shepherd and Farmer were unquestionably shaken, respectively, by the pastoral, agricultural and industrial revolutions. Similarly, the basic values of industrialism which center around the accumulation of material wealth are being shattered by the post-industrial service revolution. The profundity of this change was foreseen as far back as 1930 by John M. Keynes as he reflected on the possibility that affluence would end the age-old struggle for existence. "If the economic problem is solved," he wrote, "mankind will be deprived of its traditional purpose. Will this be a benefit? . . . I think with dread of the readjustment of the habits and instincts of the ordinary man, bred into him for countless generations, which he may be asked to discard within a few decades." 35

It is now clear that the Keynesian prediction is coming true with a vengeance. With the success of the "pie economics" of growthmanship, people have become less interested in pie. An unprecedented rise in human aspirations has taken place. "Today, many of our political leaders find it hard to realize that our undeclared post-industrial revolution has brought into being a new wave of aspirations for peace at a time when life is threatened by nuclear holocaust; justice for those whose liberty has been denied by imprisonment in institutionalized inferiority; and a higher quality of life under conditions when the pursuit of happiness through material affluence alone may quickly lead to emptiness and loss of purpose." 36

Large numbers of people are not willing to accept the old choice of kill or be killed. Large numbers of black people are no longer willing to be regarded as sub-human or sub-citizens. Many women are less willing to accept organized inferiority at work and the traditional deprecation of "women's work" inside the home. Most young people want to be treated as adults, not children, and to teach their elders some important lessons. Most poor people want dignity more than money. But all these waves of deep aspiration tend to break against the hard rocks of institutionalized military myths, white racism, male authoritarianism, premature senility, the "ill-fare lobby," apathy and the habits and instincts bred into
people for countless generations. One result has been widespread alienation. The most obvious examples are "crime in the streets" (and the still more widespread fears concerning it), riots, demonstrations, alcoholism and drug addiction. A still more fundamental result has been the breakdown of old coalitions, both national and local, and the decline of old capabilities of providing guidance and certainty.

The service revolution, finally, has taken place within the context of--and has contributed to--a still greater transformation: the emergence for the first time in history of a world society of interdependent nations. In today's perspective, the old empires were relatively small communities; the British and the Roman as well as the Chinese, Persian and Byzantine. Indeed, neither World War I nor World War II were world-wide in the sense of our present world of instantaneous communication and rapid movement. As Bruce Russett has pointed out, today "one world" has a meaning beyond the understanding even of those who lived just a generation ago. 38 This new world, sometimes called the "global village", is characterized by shifting and precarious coalitions that create new uncertainties for moulders of foreign policy.

Revolution without Revolution

In presenting the barest outlines of social change, the previous section glossed over an almost infinite variety of different patterns that have developed in different cultures and ecological environments. It jumped over the various combinations of public and private enterprise, of collectivism and individualism, that underlie the so-called capitalistic and socialistic forms of agricultural, industrial and post-industrial development. I have also emphasized social revolution without dealing directly with political revolution. This last deficiency must now be remedied--at least in part.

A social revolution, it is generally understood, involves what Martin Oppenheimer calls "sweeping changes and major breaks in the continuity of development." A political revolution, on the other hand, "involves a sudden turnover or
alteration, taking from as short a time as a few hours to, per-
haps, the course of a civil war." Less well understood, and
too little explored by political scientists, has been the con-
nection between the two.

The Russian Revolution, it is clear, involved both. But
when the Bolsheviks seized power in November 1917, they realized
that their task was not only to stay in power but to make a
social revolution. This took many bitter years. The same was
true of the 1949 seizure of power by the Chinese communists.
In both cases the old social order was changed radically—al-
though the true nature of the new order will long be debated.
As this debate progresses, one need not accept what the Russians
and Chinese say about each other. It is more than likely that
the next generation of "new classes" in both countries will
find that they are each building a certain variety of partially-
collectivized post-industrialism. In any case, both the Russian
and Chinese revolutions took place under conditions where early
industrialism had already challenged the social foundations of
widespread pre-industrial agriculture.

In Western Europe the industrial revolution was accompanied
by vast political changes. Among these were the consolidation
of nation-states, the growth of colonialism and empires, World
War I, the rise of fascist totalitarianism and the German-Italian-
Japanese Axis, World War II, the breakdown of the old colonialism
and the emergence of dozens of new nation-states.

What then are the political consequences of post-industrial-
isim?

Without attempting a full answer, I shall merely voice an
impression considering the political aspects of the service
revolution in the United States of America.

My impression is that, barring nuclear war, the American
experience will be one of social revolution without political
revolution. This impression is based upon my observation that
the major holders of power in the American political system
are (1) widely dispersed enough to avoid personal responsibility
or easy displacement, (2) capable of reducing strain and opposition by providing the reality or image of large-scale benefits, and (3) immensely skilled in the arts of co-optation. In Selznick's terms, co-optation is "the process of absorbing new elements into the leadership or policy-making structure of an organization as a means of averting threats to its stability or existence." This does not add up to the ability of America's rulers to learn what Vickers refers to as "new ways of responding" and "new ways of appreciating a situation which is new." It can add up to their ability, like the British aristocrats who adapted to industrialism and co-opted organized labor, to ride the waves of change.

All this, I believe, is tacitly appreciated by the leaders of organized labor, liberals, Black militants, White radicals and the New Lefts. Some respond by actively organizing to be co-opted on the quickest or best possible terms. Others, knowing that fundamental change in the power structure is unlikely, engage in expressive or adventuristic politics that serve as a prelude to repression by the radical right, withdrawal from the world, or both.

In either case, the certainty of no political revolution (short of the unpredictabilities of a nuclear holocaust) reinforces the agonizing uncertainty of life in a society that has lost its moorings.

The City of Sin

For centuries cities have been regarded as breeding grounds of sin, vice, crime, disorder, depravity and degeneration. In part, this has represented a romantic view of the quality of life on farms and in small rural communities. More fundamentally, it has consisted of the continuation of pre-industrial attitudes—both pastoral and agricultural—toward the city. These attitudes were long embodied in the so-called Jeffersonian tradition in the United States and in the farm bloc's struggle for farm-oriented rather than city-oriented Federal policies and appropriations. Accordingly, liberal urban planners have felt it incumbent on themselves to attack the "myth" of urban evil as contrasted with rural virtue.
In the light of the post-industrial service revolution, however, we must reconsider the liberal attitude. In the light of new developments we must consider seriously the possibility that the term "Sin City" (sometimes used in humorous response to Mayor Lindsay's efforts to establish New York City as "Fun City") may in truth apply to our emerging Nation City and its megalopolitan neighborhoods.

This brings us to the thesis that America may be a sinful society, which is essentially what Senator J. W. Fulbright meant in describing the United States as a "Sick Society." The medical metaphor, however, has its limitations. At a time when old values are being challenged, shattered or replaced, it may be more meaningful to use the simpler language of old-fashioned ethics and morality. From this viewpoint, the modern City of Sin is one in which hypocrisy, arrogance and ugliness are eating away at the True, the Good and the Beautiful.

Our biggest hypocrisy is in the race relations. We promise equality but preserve inequality, preach justice but practice injustice, say we are color-blind but pre-judge people not on the basis of who they are but rather on the color of their skin. This hypocrisy is found in our churches, our schools and universities, and our governments. It often reaches its highest point the practices of the "Suburban Bourbons" of the white suburbs that encircle our Northern cities. Racial hypocrisy, however, is paralleled by countless other institutionalized departures from truth and honesty. Our major institutions proclaim the quality of women, but treat them as inferiors. Our schools tell students to act mature, but treat them as children or robots. Self-proclaimed defenders of morality promote pornography and sexual depravity by regarding sex as something evil or dirty instead of natural and beautiful. The cry for "law and order" is often raised by lawbreakers concealed in the crevices of urban respectability: the slum landlords (including universities) who violate local building codes, the stores (including large department stores who gouge the poor
through illegally high interest rates, the real estate speculators who undermine the Supreme Court's rulings on segregation, the local government officials who wink at such law-breaking and the high-minded bankers who finance and profit from it. "Law and order" is also raised by the more lawless and disorderly elements who believe in the violent repression of the "Black rebellion" and student demonstrations through neo-fascist styles of police action or para-military activity. Similar hypocrisy is practiced every day in the week--Sundays included--by those churchmen who are the respectable bulwarks of the anti-gambling "blue laws" which divide the gambling market neatly between gambling-in-Church and gambling run by the Mafia and other elements in organized crime.

Our greatest arrogance is in the foreign policy stance which suggests that the American Nation City will be the new Rome of a new world empire and that from our activities as a World Policeman a Pax Americana will emerge. This is the peculiarly American form of what the ancients called hubris, the pride that comes before a downfall. It has been strongly buttressed by scientific and technological elites who arrogantly proclaim their ability--given enough resources for education, research, development, testing and evaluation--to solve almost any problem. One even finds those who maintain that if the modern American university were to become more involved in urban problems the urban crisis would be miraculously solved.

In contrasting the ugliness of Detroit with the beauty of Prague, Jiri Hruza recently reported on his difficulties in finding an American definition of beauty. The most conspicuous definitions related to cosmetics. In keeping with this approach, it may be noted that the most conspicuous proposals recently made in connection with beautification have related to the elimination of eyesores such as automobile graveyards, the preservation of historical buildings or the planting of trees and shrubbery in cities and along highways. Little of this is based on any genuine conception of beauty as unity in variety, as a certain style of life that expresses itself in physical surroundings and human behavior. Meanwhile, urban ugliness grows in both central cities and suburbs and is spread throughout the entire country on the tentacles of the highway network.
Taken together, hypocrisy, arrogance and ugliness hardly contribute to the growth of mutual confidence, faith in one's self and others, or trust in the future. They are breeding grounds for the deepest—not merely the more manifest—of social disorders.

One need not carry this argument to the point of denying that within the City of Sin we may not still find exemplars of the true, the good and the beautiful. In the Old Testament, it is recorded, before Sodom was destroyed, the Lord told Abraham that if but ten righteous men could be found within its gates He would spare the city. The fact that we have not yet been destroyed suggests that perhaps such a minority, which was not found in Sodom or Gomorrah, exists today in such places as New York and Detroit.

The Ignorance Explosion

Long ago, in the dim distant days of 1967, Michael Springer and I took minor issue with the idea of the "credibility gap" created by President Johnson's deceptive approach in committing American troops to an undeclared Asiatic war. The emphasis on credibility, we felt, implied that the President misled other people by withholding good information. In contrast, we suggested that both the President and the entire country were suffering from an "intelligence gap" rooted in "one-sided, missing, distorted, misinterpreted or unused information." The result, we suggested, "is that national policy-makers themselves are misled—or, to put it more mildly, are led into oversimplified, partial, and outdated views of major policy problems." We charged that "executive officials and members of Congress alike are misled by inadequate interpretation of bad information based on obsolete concepts and inadequate research and collected by underfed and overlobbied statistical agencies." 43

The clear implication was that this situation could be improved if certain prescriptions were to be followed. These prescriptions, each one of which appealed to a different following, were as follows:
1. Improved collection, analysis and processing of societal information (and we gave a host of illustrations);

2. New or improved concepts to serve as the basis of information collection (and we suggested many in the fields of population, employment, poverty, health, education, democratic participation, civil liberties, and other fields); and

3. New intelligence facilities (and we stressed the inherent logic of the pending proposals for a Council of Social Advisers to the President and a Congressional Joint Committee on the Social Report, as proposed by Senator Walter F. Mondale (D., Minn.) and a large group of Senatorial colleagues.

Without prescription we also quoted two passages from neglected poems. The first was from Edna St. Vincent Millay's Sonnet CXXXVII, with its reference to "a meteoric shower of facts that lie unquestioned, uncombined" because "there exists no loom to weave it into fabric." The second was from an essay in which Corinne Lathrop Gilb called for weaving things together through "a multi-dimensional set of values, theories, concepts and methods which converge at that high point where science and art are--in a sense--the same." At the time, some of our colleagues felt that we were too sanguine about these cures for the intelligence gap. They felt that while our efforts were worthwhile, genuine action at all three levels would be "too little too late." Nonetheless, they usually inhibited their skepticism and gave our efforts and those of others in the "social indicator movement" moral or active support. These efforts gathered momentum with the publication of Monitoring Social Change and Toward a Social Report, by HEW Secretary Wilbur C. Cohen in the last hours of the Johnson Administration.
By this time, however, our own position has changed. We are now less enchanted with the prescriptions themselves. Although we still favor them, we no longer are willing to intimate that they will provide cures for the intelligence gap.

My own view is that the development, dissemination and use of more societal information must be seen as part and parcel of the information explosion that characterizes our new service society. This information explosion is based upon hitherto unprecedented growth in science and technology, education and communication. It consists of a rising flood of messages that increasingly create an information overload by clogging our limited channel capacity and baffling our equally-limited device for filtering, selection and search.

All this was foreseen some decades ago by the philosopher Ralph Barton Perry, who defined a specialist as one who "learns more and more about less and less until he knows everything about nothing." The generalist, on contrast, was someone who "learns less and less about more and more until he knows nothing about everything." Today this may be restated in the proposition that the arithmetical increase in knowledge and its dissemination leads directly to an exponential increase in ignorance.

First of all, new advances in scientific knowledge open up entirely new areas of certified ignorance. In previous eras it was assumed that the "knowable" was like ore buried in the ground. The task of scientists was to mine a rich vein, deplete it and--having learned everything there was to be known--move on to something else. Scientific laws were "out there" in a completely knowable universe waiting to be uncovered or discovered. Today, the universe of knowledge is now seen infinite and expanding. Instead of depleting a limited supply of ore, major advances in science and technology typically open up new areas of inquiry (or certified ignorance) by identifying new variables which can enter into new permutations with existing ones. As Harvey Brooks has put it, "The more we understand the more parameters we can perceive in a problem. The more pattern we can see in the world around us, the more questions we can ask about it, the more possibilities and potential variations we can see." These advances also consist of new generalizations which create problems of reconciliation with, and adjustment to, existing generalizations.
Accordingly, the more scientists and technologists know, the more they adopt the stance of the "non-knower" (rather than know-it-all) and the searcher. "I know but one thing," said Socrates shortly before death, "and that is that I know nothing." The modern scientist, in contrast, lives by the axiom that he knows less because he has learned so much...

Second, the more knowledge is created through research processes, the more it outstrips the capacity of most searchers to "keep up" and assimilate. Their easiest protection against information overloading is further specialization. This means that the knowers, learning more and more about less and less, becoming progressively ignorant about more and more. Even within the chosen area of specialization, however, the researcher spends an increasing proportion of his time trying to learn what other people have done or are doing. This is "an inevitable concomitant of the information explosion and is probably the limiting factor in scientific progress." There is reason to suspect, moreover, that many researchers feel increasingly unsuccessful in keeping up—that is, increasingly ignorant even within their own chosen areas. The typical remedy is increased specialization, which provides "screening out" and "switching off" mechanisms to cope with information overload. This, in turn, not only accelerates the production of information overload for others. It also leads to the growth of increasingly technical jargon which, while facilitating communication among those in the charmed inner circle, prevents communication with the uninitiated and helps to certify the depths of their growing ignorance.

Finally, and most important of all, our major data collection efforts are based to a large extent on old concept exquisitely attuned to measuring certain events of earlier decades, but increasingly out of tune with rapidly changing realities. Indeed, the understandable desire for strictly comparable data over long periods of time leads to the hardening of the intellectual categories. Old definitions are maintained for the simple reason that any fundamental change in them would mean changing the unit of measurement in midstream. As a result, the most sophisticated time series data in our expanding data archives are the aristocrats of our information system. Like the aristocratic nobility of the 18th and 19th centuries, they are beautifully refined—but increasingly irrelevant. In other places I have made this case
with respect to such ultra-respectable indicators as the gross national product, the cost of living index and the official data on labor force and unemployment. Many of the pioneers in the social indicator movement have already driven the same point home again and again with respect to the standard indicators on such subjects as crime, education and health.

If more meaningful information is to be attained and the pressures toward the expansion of ignorance are to be at least contained (if not pushed back), then new -- and perhaps revolutionary -- concepts and models are needed.

New Models for Anthropolis

Some of the most important vistas for new concepts and models are to be found in the area of general systems theory. Our greatest difficulty is that, despite significant progress in understanding non-human systems, we have no semi-respectable theories of systemic change, either across the board or with reference to those slices we call economic, political, cultural, or social. Our basic concepts are still in the process of being adjusted to the transition from preindustrialism to industrialism. Our tools of intellectual analysis are mostly developed and used by intellectual artisans operating within narrow craft-union-style confines. Sadly enough, all these limitations tend to be hidden by the arrogance of the new knowledge elites and the extravagant promises and exaggerated claims with which they often accompany their newest idea or latest bid for resources. One reason this obscurantism can flourish is our lack of reality-oriented concepts of planning and design. Both are still largely seen as technical processes rooted in traditional disciplines and -- what is worse -- abstracted from the realities of ongoing conflicts among personal and group interests.

Peter Drucker (1968: 350) vividly expresses one of the deepest yearnings of avant garde scientists and policy-makers. After predicting that in the coming years "every single one of the old demarcations, disciplines and faculties is going to become obsolete," optimistically observes, "We are shifting rapidly from a Cartesian view of the universe in which the accent has been
on parts and elements, to a configuration view, with the emphasis on wholes and patterns."

That some shift is taking place is clear. But its rapidity is questionable. Certainly in the field of urban modelling, no significant progress toward a configuration view is yet evident in the three- or four-year time covered by Harris' 1965 review of what was going on and the 1968 review by Wilson. A careful examination of these two excellent pieces reveals, instead, rapid Cartesian progress (particularly in the nonhuman aspects of urban systems) and stagnation with respect to looking at wholes and patterns.

Another difficulty has been the utopian search (mimicking the physicists' search for a fully unified field theory) for some single, all-purpose theory, model or methodology. In its early days, operations research was hailed as a technique of general relevance. We now know that its relevance is limited almost entirely -- in terms well defined by Russell Ackoff (1968), one of its founders and most distinguished practitioners -- to certain limited problems in the areas of search, sequencing, queuing, inventory replacement and maintenance, allocation, and competition. Recently, systems analysis in both defense and civilian operations, particularly under the aegis of what the Bureau of the Budget called PPBS, was oversold far beyond its sphere of relevance. Yet the urge still persists to design and computerize the operations of -- in the words of Edna St. Vincent Millay's sonnet -- a single loom to weave into a single fabric the "meteoric shower of facts that lie unquestioned, uncombined."

A more fruitful approach, in my judgment, is one that starts with realistic acceptance of three realities of sequential decision-making and model-building.

First, decision-making is an endless sequential process, with every action involved in a confluence of many streams of choice and choice-justifying behavior. As in public politics, each stream involves a tangled sequence of successive compromises punctuated by frequent occasions of deadlock and avoidance and occasional victories, defeats and integrations.

Second, this involves a constant shifting from non-calculated or unconsciously calculated decisions to explicitly calculated decisions, from occasional calculations based on sophisticated models to calculations based on tacit, intuitive or primitive models.
Anyone who tried to handle an entire decision-making stream through sophisticated models alone (whether computerized or not) would be like a lumberjack walking across a river of floating logs but only willing to step on logs of some prescribed color, smoothness, and esthetic appearance.

Third, scientific model builders are inevitably engaged in seeking greater status, prestige and self-respect through the production of intellectual services that can be clearly distinguished in content, in packaging, or both from the services of competitors. This provides more logs to choose from without any guidance on what might be chosen at any particular moment. In systems theory itself, often regarded as a unifying force, one finds these same ongoing processes of effulgent product differentiation. Thus von Bertalanffy (1968: 19-23) distinguishes among the following species of systems theory: classical systems theory, computerization and simulation, compartment theory, set theory, graph theory, net theory, cybernetics, information theory, the theory of automata, game theory, decision theory, and queuing theory. Other distinctions may be made between systems as methods of doing things and systems as sets of interrelated parts, static and dynamic systems, open and closed systems, self-controlled and other-controlled systems, verbally defined and mathematically defined systems. Another important distinction is between special and general systems. The latter might be defined as that special systems approach which -- in the language of the original program of the Society for General Systems Research -- deals with "the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge." Its major functions are to:

(1) investigate the isomorphy of concepts, laws, and models in various fields, and to help in useful transfers from one field to another; (2) encourage the development of adequate theoretical models in the fields which lack them; (3) minimize the duplication of theoretical effort in different fields; and (4) promote the unity of science through improving communications among specialists (von Bertalanffy, 1968: 15).

In my judgment, the most useful approach in the general systems area is the development of systems concepts and perspectives that can be used in sequential decision-making and competitive model-building. This means dropping any pretensions at supplying grand, all-embracing theory or an all-purpose methodology. Basic systems concepts, however, can rather serve to help older disciplines become more relevant, bring into being new disciplines, subdisciplines
and methodologies and help specialists from many fields work together more fruitfully.

My own work in developing a general systems framework for urban model-building is based on concepts such as the following:

1. Every human system may be analyzed in terms of its changing location in space and time, its internal structure, its performance or functioning, and its transactions with its external environment.

2. Any territorial entity with people in it (from the planet to a nation, a city, or a neighborhood) may be regarded as a partially systemic aggregation in space-time of individuals, families and other social groupings together with the nonhuman resources -- natural, man-made and man-changed -- separately or collectively used by them.

3. All national entities are open systems interrelated with an emerging world society, while all cities and other subnational areas are open systems inextricably related to nation and world.

4. In the United States, no urban areas can be properly understood without at least an awareness of fundamental societal changes from advanced industrialism to a service or perhaps a postservice society.

5. The larger social groupings in urban areas tend to operate across the area's boundaries or to be part of national or international groups that so operate.

6. Each human component of an urban entity -- from person and family to large organizations -- has its own capabilities for internal guidance and its own plans, programs, or policies concerning itself and its environment.

7. The processes of getting better information, making forecasts, analyzing alternative futures, and establishing goal patterns are necessarily competitive ones, with any procedures of formalized planning leading at best to a partial structuring of the competitive process and at worst to monopoly power for a dominant coalition.
The strength of this approach is that it boldly defines any urban system as an open system that cannot be understood merely by looking at what transpires within or across its boundaries. But this too is its inherent weakness -- or rather the weakness of a situation in which no system theories have yet been devised to apply to the larger territorial entity of the Nation City itself.

Just what is advanced industrialism and the broad nature of structural change in advanced industrial societies? How do their capitalistic forms differ from the communist industrialism being developed under high pressure by the Soviet Union and China? What are the implications for the maintenance or enlargement of human freedoms and human happiness or -- as many suspect -- for the slow and insidious growth of a new system of manipulative, technology-based authoritarianism resembling Aldous Huxley's Brave New World? These are the kinds of questions that more and more systems theorists should address themselves to between the present and 1984...
### Table 1. Metropolitan Clusters, 1960

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Resident Population (millions)</th>
<th>Constituent Counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Los Angeles</td>
<td>9.0</td>
<td>California: Los Angeles, Orange,\n</td>
</tr>
<tr>
<td>3.</td>
<td>Chicago</td>
<td>8.5</td>
<td>Illinois: Winnebago, Boone, Cook,\n</td>
</tr>
<tr>
<td>Rank</td>
<td>Name</td>
<td>Resident Population (millions)</td>
<td>Constituent Counties</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>--------------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Detroit</td>
<td>5.9</td>
<td>Michigan: Monroe, St. Clair, Washtenaw, Jackson, Clinton, Eaton, Ingham, Ionia, Lapeer, Livingston, Shiawassee, Genesee, Saginaw, Bay, Macomb, Oakland, Wayne Ohio: Lucas</td>
</tr>
<tr>
<td>7</td>
<td>San Francisco</td>
<td>4.2</td>
<td>Calif.: Alameda, Contra Costa, Marin, Solano, San Francisco, San Mateo, Santa Clara, Sacramento, San Joaquin</td>
</tr>
<tr>
<td>8</td>
<td>Washington</td>
<td>3.9</td>
<td>D.C.: Washington Maryland: Frederick, Harford, Anne Arundel, Baltimore, Baltimore City, Montgomery, Prince Georges Virginia: Arlington, Fairfax, Alexandria City, Falls Church City</td>
</tr>
<tr>
<td>Rank</td>
<td>Name</td>
<td>Resident Population (millions)</td>
<td>Constituent Counties</td>
</tr>
<tr>
<td>------</td>
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<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>9.</td>
<td>Cleveland</td>
<td>3.7</td>
<td>Ohio: Ashtebula, Columbiana, Gauga, Portage, Cuyahoga, Lake, Summit, Stark, Mahoning, Trumbull, Lorain</td>
</tr>
<tr>
<td>11.</td>
<td>Cincinnati</td>
<td>2.1</td>
<td>Ohio: Greene, Miami, Montgomery, Butler, Hamilton, Clarke Kentucky: Campbell, Kenton</td>
</tr>
<tr>
<td>12.</td>
<td>St. Louis</td>
<td>2.1</td>
<td>Missouri: Jefferson, St. Charles, St. Louis, St. Lou's City Illinois: Madison, St. Clair</td>
</tr>
<tr>
<td>13.</td>
<td>Buffalo</td>
<td>2.0</td>
<td>New York: Orleans, Wayne, Erie, Niagara, Monroe</td>
</tr>
<tr>
<td>Rank</td>
<td>Name</td>
<td>Resident Population (millions)</td>
<td>Constituent Counties</td>
</tr>
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</tr>
<tr>
<td>15.</td>
<td>Dallas</td>
<td>1.7</td>
<td>Texas: Denton, Johnson, Tarrant, Colin, Dallas, Ellis</td>
</tr>
<tr>
<td>16.</td>
<td>Miami</td>
<td>1.5</td>
<td>Florida: Dade, Palm Beach, Broward</td>
</tr>
<tr>
<td>17.</td>
<td>Minneapolis</td>
<td>1.5</td>
<td>Minn.: Anoka, Dakota, Hennepin, Ramsey, Washington</td>
</tr>
<tr>
<td>18.</td>
<td>Seattle</td>
<td>1.4</td>
<td>Wash.: King, Pierce, Snohomish</td>
</tr>
<tr>
<td>19.</td>
<td>Houston</td>
<td>1.4</td>
<td>Texas: Harris, Galveston</td>
</tr>
</tbody>
</table>

Source: David E. Boyce, Michel Chevalier, Jean-Marc Choukroun, and Jeffrey Patterson, University of Pennsylvania Institute for Environmental Studies, unpublished data.
### Table 2. Megalopolitan Areas and Head Office Location

<table>
<thead>
<tr>
<th>Metropolitan Clusters</th>
<th>Megalopolitan Areas</th>
<th>Head Office Location</th>
</tr>
</thead>
<tbody>
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<td><strong>Rank</strong></td>
<td><strong>Metropolitan</strong></td>
<td><strong>Megalopolitan</strong></td>
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<td></td>
<td><strong>1960</strong></td>
<td><strong>1965</strong></td>
</tr>
<tr>
<td><strong>1. New York</strong></td>
<td>14.8</td>
<td>221</td>
</tr>
<tr>
<td><strong>6. Boston</strong></td>
<td>5.2</td>
<td>21</td>
</tr>
<tr>
<td><strong>4. Philadelphia</strong></td>
<td>6.8</td>
<td>47</td>
</tr>
<tr>
<td><strong>8. Washington</strong></td>
<td>3.9</td>
<td>7</td>
</tr>
<tr>
<td><strong>14. Hartford</strong></td>
<td>1.9</td>
<td>12</td>
</tr>
<tr>
<td><strong>3. Chicago</strong></td>
<td>8.5</td>
<td>92</td>
</tr>
<tr>
<td><strong>5. Detroit</strong></td>
<td>5.9</td>
<td>33</td>
</tr>
<tr>
<td><strong>9. Cleveland</strong></td>
<td>3.7</td>
<td>32</td>
</tr>
<tr>
<td><strong>10. Pittsburgh</strong></td>
<td>3.2</td>
<td>29</td>
</tr>
<tr>
<td><strong>11. Cincinnati</strong></td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td><strong>2. Los Angeles</strong></td>
<td>9.0</td>
<td>21</td>
</tr>
<tr>
<td><strong>7. San Francisco</strong></td>
<td>4.2</td>
<td>23</td>
</tr>
<tr>
<td><strong>12. St. Louis</strong></td>
<td>2.1</td>
<td>22</td>
</tr>
<tr>
<td><strong>13. Buffalo</strong></td>
<td>2.0</td>
<td>8</td>
</tr>
<tr>
<td><strong>15. Dallas</strong></td>
<td>1.7</td>
<td>11</td>
</tr>
<tr>
<td><strong>16. Miami</strong></td>
<td>1.5</td>
<td>(NA)</td>
</tr>
<tr>
<td><strong>17. Minneapolis</strong></td>
<td>1.5</td>
<td>17</td>
</tr>
<tr>
<td><strong>18. Seattle</strong></td>
<td>1.4</td>
<td>6</td>
</tr>
<tr>
<td><strong>19. Houston</strong></td>
<td>1.4</td>
<td>6</td>
</tr>
<tr>
<td><strong>20. Kansas City</strong></td>
<td>1.3</td>
<td>(NA)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>80.3</td>
<td>69.2</td>
</tr>
<tr>
<td><strong>TOTAL U.S.</strong></td>
<td>179.3</td>
<td>179.3</td>
</tr>
<tr>
<td><strong>% of U.S.</strong></td>
<td>45%</td>
<td>30%</td>
</tr>
</tbody>
</table>

*Continued next page*
NOTES TO TABLE 1

1. Midmeg and Westmeg are still in process of formation.

2. Includes 500 Industrial and 250 Non-Industrial firms as listed annually in Fortune. Changes in their total sales and assets—together with the sales and assets concentration in the megalopolitan areas—have not yet been calculated. It may be hypothesized (again, calculation not yet made) that the megalopolitan areas contain various branch offices of all of those among the 750 with head offices located elsewhere. NOTE: First calculation did not include cities with less than 5 head offices, thus NA for Miami and Kansas City.
NOTES


2. Daniel Bell, "Toward a Social Report, 1," The Public Interest, No. 15, Spring, 1969, p. 77.


6. "In Defense of Our Cities: A Statement by Directors of University Centers for Urban Studies," University Urban Study Centers: Observations from Within, op. cit., p. 67-68. Military expenditures, of course, may also channel resources into economic activities in urban areas.


37. Ibid., "The Military Myths," here discussed, are those dealing with "military bases as the protector of American trade, world communism as a military threat, poverty as the cause of war, and greater destructive capacity as all purpose power." p. 325-328.


44. The full text of Sonnet CXXXVII, by Edna St. Vincent Millay:

Upon this age, that never speaks its mind
This furtive age, this age endowed with power
To wake the moon with footsteps, fit an oar
Into the rowlocks of the wind, and find
What swims before this prow, what swirls behind--
Upon this gifted age, in its dark hour,
Rains from the sky a meteoric shower
Of facts . . . they lie unquestioned, uncombined
Wisdom enough to leech us of our ill
Is daily spun; but there exists no loom
To weave it into fabric; undefiled
Proceeds pure Science, and has her say; but still
Upon this world from the collective womb
Is spewed all day the red triumphant child.


49. Ibid.
CONTROL OF CRIME AND VIOLENCE
IN PUBLIC HOUSING

A Systems Framework
For Improving Security
In Detroit Public Housing

LAWRENCE M. THALL

1. INTRODUCTION

During 1968-69, a survey was made of security problems in two high-density, publicly owned, multi-family housing developments in the core area of Detroit. The objective was to study the incidence of crime, the physical vulnerability of brick and mortar, and the attitude of the people towards security measures. This information is necessary to develop both hardware and systems to successfully deter or control criminal behavior, and, hence, minimize property losses. It was further planned to test security measures in an experimental context, using samples of public housing in a large city, in cooperation with an experienced consulting firm.

Contact was made with police, municipal, and social agencies in the city. Data was collected on crime, and on the breakdown of public tenants by race, family, and economic status. Neighborhood social welfare agencies were questioned informally on the attitudes of tenants toward both the police and housing authorities. Finally, the statistics of crime within the projects were obtained from guard reports and compared with police records.

One handicap in the study was the fact that guard reports did not have objective reporting formats, comparable with Uniform Crime Reports. However, they did clearly indicate that crime is a serious problem in public housing projects—serious enough to warrant further investigation. There are no definitive studies on crime in such projects on a national
scale. It has been shown that large cities such as Detroit are high crime areas: cities with populations over 1 million and cities with populations over 250,000 rank first and second respectively in total crime rate per 100,000 population for the U.S. And the problem has grown with a 16-18 percent increase in the crime rate between 1967 and 1968 for the two categories of large cities. These statistics are based on what is known or reported to the police and may reflect large-scale understatements.

In defining the problem, a basic dilemma was uncovered. Much research, and a large proportion of official action, is symptomatic: controlling crime and violence on a specific basis. Ending "crime in the streets" does not alleviate the causes of crime—the threat environment discussed here is multi-faceted, including demographic, psychological, political, police and legislative factors. An overview is required before specific control mechanisms can be effective. The tenants' responses were immediate and with a narrow focus: increase housing guards, or repair the lights in the halls. Professional social welfare personnel had a broader point-of-view: the solution to the problem of crime was a part of the development of community identity for low income groups, aided by massive supportive effort by social and housekeeping services. The question is put: shall we end crime, or shall we end the causes of crime?

The problem of crime in public housing will remain with us. Despite recent legislative and policy changes, there is no apparent large-scale economic alternative to building high rise, low income housing in the central cities. It is true that legislation, such as the Housing Act of 1968, will exert some positive influence; in cooperation programs, such as in section 235 which (1) provides modest subsidies to enable lower income families to purchase new and in some cases existing homes; also (2) enable local housing authorities to purchase or lease new or existing housing. Equally true is that section 207 of the 1968 act now prohibits the construction of high rise elevator projects for families with children unless there are no practical alternatives. However, many economic, political and social impediments exist in the
near term implementation of such programs; e.g., low funding, slow legislative appropriation action, uncoordinated functioning and protective attitudes of municipal agencies, discriminatory attitudes of the population against the poor and black, and rigid zoning laws and shortages of qualified inspection personnel.

If the same housing patterns for low income groups will continue more or less in the future, then each additional unit built will increase the potential for criminal activity. At present it is essential to provide public housing with a posture that at the minimum is safe for a man and his family to occupy or possibly, more significant, for the woman where there is no male family member. The alternative is to continue to increase the size of public and private police forces, which is a costly and wholly uneconomic venture.

In dealing with crime and violence in high-rise buildings, in high density, low income neighborhoods, we are dealing with a symptom, a very serious symptom of a problem of being poor, that is much deeper than crime itself.

There have been numerous symptoms in recent years, such as the increased number of school dropouts, juvenile delinquency, dope addiction, swelling welfare rolls, and acute housing shortages. Government responses have included measures such as increased police forces, more welfare payments, massive urban renewal, public housing—a long list of treatments for individual symptoms. Because the relationship of these symptoms and their root causes has not been perceived, the treatments have utterly failed to cure the disease—poverty.

* A study by a prominent civil rights organization, reported by the New York Times, December 13, 1968, called for employing armed guards in every lobby (1700 approximately) in public housing in New York City. The estimated cost could run as much as 50 million to $75 million per year. Ancillary benefit: increased probability of shoot-outs, loss of life, and heightened apprehension of residents.
The final observation reached was that there are some new and effective approaches to the control of crime and violence in housing projects—utilizing advanced products of the hard sciences such as data processing, electronic detection devices and communications systems. But none of these will be effective in the long run unless we use them with the newest advances in the soft sciences that deal with human behavior, the community, city planning and mental health.

The rest of the paper will deal with a categorical description of the crime threat to security in public housing, followed by a taxonomy of the crime threat and formulation of feasible solutions. However, before diagnosis and prescription of treatment, there must be perceived the relationship between symptoms and root causes in the interest of long term prevention of the causes of crime. Who are the people in public housing; how has public housing failed them?

2. THE PROBLEM

2.1 The People Who Inhabit Public Housing

The people—the low and moderate income groups—who inhabit public housing have one thing in common: insufficiency of funds. They consist of the elderly, the broken family, the unemployed, the seasonally employed, the large family, the family or individual with severe social adjustment problems. Four major groups of characteristics describe them.

1. Income characteristics (levels of annual earnings, regularity of earnings, sources).

2. Individual and family characteristics (age, family size and structure, stability, self-sufficiency vs. dependency, emotional and behavioral problems).

3. Mobility potential.

4. Racial, ethnic, cultural characteristics and needs.
Income Characteristics of Subsidy Households*

Low Income Families

As of the late sixties, among all the people in the United States who can be classified as poor, somewhat less than 25 percent receive public assistance. Among those receiving public assistance only about 7/1.42 percent live in public housing. In Detroit 36.8% of all families are eligible for public housing. Among those living in public housing approximately 56/70 percent receive public assistance or benefits. Among the non-elderly households 35.7/51.7 percent receive public assistance or other benefits from public resources. The proportion of those in Detroit public housing receiving public assistance is several times the national proportion (25%) of the poor receiving public assistance.

As incomes go down, the correlation with unemployment, under-employment, unemployability, family and emotional instability, behavior problems, poor housekeeping standards, credit problems, etc., increases. It must be reiterated here that by no means are all very low-income families "problems" from the viewpoint of the housing agency. Nevertheless, the incidence of such problems among the low-income families is higher—which greatly complicates the housing operational job and imposes far heavier burdens upon community facilities and services. In Detroit public housing there are 65.7 percent of all families with no employed member.

Individual and Family Characteristics

Not only is most of the newly developed public housing being designed for the elderly, but much of the existing supply is being rented to the elderly. In 1967, 31/47.6 percent of the households in public housing were elderly. The Detroit

* When the statistic shows two figures, such as 56/70 percent, the first figure, 56%, is a national statistic; the second figure, e.g., 70%, is a Detroit Public Housing statistic.

**1969 statistic for Detroit
Housing Commission has initiated no new developments since World War II, other than to complete the development of one project that had been delayed by the war. At this time nearly 50 percent of all the units are rented to elderly households. The actual number of families with children accommodated in public housing in Detroit in 1967 was less than in 1955.

Family Size

It is part of the folklore of housing for low-income families that large units are in shortest supply and that families of six or more persons have the greatest difficulty obtaining housing. However, there are surprisingly little hard statistical data correlating income with family size in urban areas and equally little concerning the availability of dwellings of four or more bedrooms in relation to rent or price levels. In Detroit public housing, median income is $2311 and median number of minor children is four.

There are some data pertaining to the numbers of children and elderly among the poor. According to the report on the Dimensions of Poverty issued by the Office of Economic Opportunity in 1965, there were approximately 30 million poor persons in urban areas. Of these, nearly 50 percent were 20 years or younger and 40 percent were 15 years or younger. Slightly less than 17 percent were 65 years or older. About 33 percent were adults between 21 and 65. This would suggest a ratio of one and one-half children per adult. However, that in itself tells very little, because it does not separate out the childless adults.

A more meaningful statistic indicates that among poor families having minors the average number of children per family was about 3.3/2.7. While the median was not indicated, it is probable that it was somewhat above 3 but under 4.

Family Structure

Among the nonfarm poor households with heads under 65 years, about 44 percent have female heads. This includes those with and without children. Single persons living alone are included as "households." Among those 65 years and older, about 50 percent of the households have female heads.
Among public housing tenant families with minors in 1966, 42.2 percent were "broken," practically all of them with female heads. Among those admitted to public housing in 1966, the proportion was 48 percent—indicating a substantial upward trend. In addition, there is a definite trend in the direction of larger families; i.e., more children per household in female-headed families. Statistics for Detroit, although inexact, indicate somewhere between 28-40% of all families could be classified as "broken."

Thus, low-income family housing developments are steadily becoming colonies of female-headed, fatherless families with several children each.

Family Disorganization, Behavioral Characteristics

It is axiomatic and trite to point out that generalizations about any groups are likely to be false. Not all poor people are disorganized, have household problems, or are poor housekeepers. Conversely, such problems are not limited to people who are poor. Nevertheless, these two things can be said:

- Disorganized families without competent male heads, and people with serious personality and behavior problems, are likely to be poor. Also, they are likely to become problems to others as well as to themselves.

- When middle- and upper-income people suffer problems such as the above, the family itself is likely to seek help, and there are likely to be many helping resources among relatives, friends, and institutions. Thus, the incidence of such problems among the more affluent is likely to be less apparent.

The frequently stated pronouncement that the principal characteristic of poor people is that they do not have money has considerable validity. That, at least, is a common denominator. However, it is simplistic and does not tell more than part of the story. Among those with low incomes there are many who maintain the style of living and the dignity of
people with greater resources. On the other hand, there are many who conform to a style of living which bespeaks slovenly habits, lack of concern for order and cleanliness, absence of discipline, irresponsible and aggressive behavior, and the like.

There can be no doubt that if the very poor are to be housed without selectivity as to behavioral or housekeeping standards, and in relatively large concentrations, the net product will be one of critical deterioration of both social and physical environment—unless design, facilities, management practices, and services are especially directed to cope with the unique problems that result.

Among the problems that arise and must be dealt with are the following:

- Children are often left without home supervision. Either there is no male head and the mother works part or full time, or both parents are working at least part of the time.

- Even if the mother is in the home, her control over the children as they reach teen-age is weakened by the absence of a male head.

- The entire style of life, whether only one or both parents are present, is often highly permissive, undisciplined, or disorganized.

- The children are not exposed to or conditioned to creative and constructive leisure-time activities.

- The family's resources are too meagre to be invested in constructive activities.

- Emotional and behavioral problems have high incidence levels.

- Children have few success models after which they can shape their own lives.
Peer group pressures practically forbid individuals to pursue or conform to middle-class patterns or norms.

Poor people are conditioned to expect exploitation. It might be said that being exploited, or assuming that exploitation is the norm, is part of the culture of poverty. Poor people tend to believe that they exercise little control over their environment—that their lives and conditions around them are controlled from without. Because of this conditioning they do not readily distinguish between profit-motivated housing operations and non-profit or subsidized operations. Because of this conditioning or outlook, there are more than the usual barriers and difficulties in cultivating the cooperation and responsible participation of tenants in the improvement and maintenance of the quality of their own environment.

The above is not a comprehensive catalog of the characteristics of those who not only have too little income, but conform to the style of life of the poverty class.

**Mobility Potential**

The above characterization leads to the question of how many of those who do conform to the poverty life style are, or would become, upwardly mobile and would adapt to the more conventional styles of living.

Mobility might be seen as occurring in any of three respects: (1) a family might improve its income situation without particularly changing its style of life; (2) a family might change its style of life without improving its means; or (3) both might occur.

It might be helpful to think of the low-income class as consisting of three subgroups as follows: (a) the mobile; (b) the potentially mobile; (c) the non-mobile.
The mobile are those who have the capacity to live responsibly, and eventually to earn their way without subsidy. They may have temporary problems such as ill health, a short-term emotional crisis, or unemployment, or they may be students. In any event, their principal need is an economic boost. While they may require services, they are capable of utilizing whatever services are generally available to the public.

The potentially mobile are those who may over a period of time be responsive to an improved environment, opportunities for education, training and employment, counseling, and health and welfare services. They include people of many racial and cultural backgrounds, a wide range of health, emotional and behavioral problems, and varying levels of education and training. They constitute a class only in the sense that they need intensive help and possess the potential for advancement and self-sufficiency.

The non-mobile are those for whom there is little expectation of change in economic status or in style of living. To a considerable extent, the elderly should be considered non-mobile, although that is not true of all. It would also apply to the chronically ill and the critically handicapped. More than 50% of all Detroit public housing families fit this category.

There are no other general categories that with propriety or accuracy could be classed as definitely non-mobile. It must be assumed that all children, regardless of how disorganized their homes may be, are potentially mobile, provided the conditions and services are favorable. To a lesser extent the same must be assumed about young adults.

Racial and Ethnic Characteristics

About 30 percent of all urban poor persons are non-white. However, there is considerable difference among age groupings. About 40 percent of all poor children are non-white, while only 15 percent of the elderly poor are non-white. Sixty percent of all non-white children are in poor families.
The United States Census in 1960 reported that 61 percent of all non-white households in Standard Metropolitan Statistical Areas had incomes of $4,000 or less, compared with 25 percent of the white. However, 81 percent of all families with incomes under $4,000 were white.

In 1956, 56.2/69.6 (1969 Detroit) percent of all tenant households in public housing were non-white. Among those admitted to public housing that year, 43 percent were non-white. Turnover for white families in public housing is higher than for non-whites. Thus, the ratio of non-whites living in public housing at a given time is higher than the ratio of those being admitted.

In proportion to their numbers among low-income families, more non-whites than whites live in public housing. Overall, for the United States as a whole, and by region, it would be inaccurate to charge that there is discrimination against Negroes in public housing, although such may occur in particular areas.

Public housing, however, by its very nature has been largely segregated and has tended to reinforce segregation. The pattern was firmly set in the initial stages of public housing programs, when practically every local authority specifically labeled projects as white or non-white. To a large extent, public housing projects were located in such a manner as to identify with the racial pattern of the area.

During the 1950's, many local authorities were compelled by state fair housing laws to discontinue excluding Negroes from "white" projects. In 1962 President Kennedy issued Executive Order 11063, which prohibited racial discrimination in publicly assisted housing everywhere in the United States.

In the large cities outside the South, the low-income non-white families with children are increasing in numbers while the numbers of whites in that category are declining. In addition, it has been noted that white low-income families are much more mobile and move out of public housing at a much faster rate than non-whites. This outward movement is accelerated as the proportion of non-whites in particular developments increases.
Thus, except for housing for the elderly, public housing in many of the larger cities has become a housing program for low-income Negro families, predominantly on public assistance, and predominantly husbandless and fatherless.

The pattern is not consistent, of course. In the Southwest, there are large proportions of Latin Americans, and in New York City the Puerto Ricans are strongly represented.

This predominance of Negroes and ethnic minorities in public housing should not be permitted to cloud the fact that in actual numbers there are more white, Anglo-Saxon families in the low-income brackets than there are minority families.

Has public housing satisfied the needs of the low income groups?

2.2 The Failures of Public Housing

Problems of Operating and Maintenance Expenses - 1969

"Faced with crushing financial deficits, government-owned housing for the poor across the country has begun a spiral of deteriorating that some officials believe may end in catastrophe..."

"In Boston, New Haven and Detroit, housing officials frankly concede that there may be lapses of heat this winter, since old boilers in projects are in desperate need of replacement or repair...Elsewhere windows stay broken for days or weeks awaiting attention from pressed maintenance crews. Halls are filthy. Grounds are unkempt...

"Rents have been raised in a number of cities to meet soaring operating costs that have outrun Federal subsidies. But the effect in some cases has been to make the housing too expensive for the lowest income residents it is meant to serve...Fifteen of the countries major housing authorities were cited on the verge of bankruptcy or with deep financial problems...If present patterns continue, the housing agency (HUD) expects 200 more authorities to be in financial trouble soon..."
"The source of the problem is that Federal subsidies do not cover the most inflationary element in government owned housing projects--operating expenses. These costs are meant to be paid by rents. But in Detroit, for example, operating expenses have risen 106 percent since 1952 while tenants income have gone up only 9 percent...

"To keep rents relatively low, HUD makes annual grants to the authority to cover interest payments, or debt service on bonds sold for housing construction. Legislation is now pending in Congress to permit additional Federal subsidies that would be applied to operating costs...

"New York and some other cities charge welfare recipients higher rents than working families since in some states those on welfare get their total rents paid by the government. This is a way for the housing authorities to get a subsidy in effect from the welfare system...

"In some states however a rise in rent for a welfare tenant would mean no rise in his check from the government and would simply mean the recipient would have less for food and clothing."

Problems of Security

Washington has questioned the wisdom of allowing projects in San Francisco and New York to provide their own security forces, although H.U.D. concedes that rising vandalism has been a major component of rising costs, along with soaring wages and the costs of materials.

"H.U.D. says protection is the job of the city police department," explained Walter I. Scott, deputy executive director of San Francisco's authority, which has a small force for its 6,000 apartments.

New Haven is establishing a police for its projects with a grant from the State of Connecticut, but the grant will last only one year, and must be renewed for the force to continue operating."
New York's Housing Authority police are paid partly by income from rents, but mostly (60 per cent) from the city's expense budget.

Poor maintenance and vandalism seem to feed on each other.

"The tenants feel like we probably don't care too much about the property because we don't get enough maintenance men, so they probably tend to take less care of it," said Pat Daugherty, director of the Kansas City Authority.

Some local officials think increased vandalism results from the relaxation in recent years of the strict admission standards that kept out broken families. A welfare mother without a husband, they reason, cannot adequately supervise five or six children.

But some authorities are resisting H.U.D.'s efforts to raise the average income in the projects. Clifton Lander, H.U.D.'s director of tenant services, says Washington is trying to attain "a pretty good economic mix of families" in projects that are now "skewed to the lowest of the low income."

Some local officials maintain that those are the families with the greatest need for subsidized housing. Others are raising income levels.

However, tenants are better organized and more sophisticated than ever before, officials say, and often residents' objections to increases in rents or income limits can turn a problem into a nightmare.

When the St. Louis Authority, faced with heavy deficits, tried to raise rents in its 6,900 apartments by about 10 per cent February 1, tenants started a rent strike that is now in its ninth month.

"You keep cutting and cutting services--our projects are in terrible condition physically," said Thomas Costello, the St. Louis Authority's director of finance. "While we're trying to live within the budget, the place is falling apart."
He said scores of windows were broken, and narcotics addicts were stripping copper flashing from around the panes, letting wind and rain into apartments.

Public Housing Problems - 1965-1967

A study published by the National Association of Housing and Redevelopment officials in 1967 then featured case histories of critically depreciated housing projects, demoralizing social environment, and alienation of tenants.

Researchers and writers on conditions in public housing attribute a variety of causes for these conditions, of which the following are typical:

- Poverty is the root problem. When very poor people are grouped together in a visible setting such as in public housing the full significance of poverty becomes evident. Reducing rents to 20 percent of the poor family's income or supplying shelter to welfare families may alleviate but does not solve the poverty problem.

- Large aggregations of poor families, particularly those who are disorganized and maladjusted, compound the problems. Such families need to be interspersed with more stable families who can provide the stability and models to which the less stable can conform.

- Public housing is poorly designed for family living. High rise developments are especially bad. Dwelling units are often overcrowded. Densities are too high. Community facilities are lacking.

- The conventional public housing formula has been too rigid. Public housing was a mechanistic rather than a humanistic program. It attempted to force people into compartmentalized modes of living quite unrelated to human needs and desires.
- While not all social misfits are poor and not all poor are misfits, there is a great deal of overlapping. People who are both poor and beset with problems need many services to help solve their problems and to prevent them from being problems to others. There have been too few services available to public housing tenants.

- Public housing has been an attempt to do things for selected poor families. Management is unilateral. Tenants have no sense of involvement. Tenant apathy and hostility are inevitable under such circumstances.

Mistaken Assumptions in Public Housing - Historical Perspectives

1. Lack of Sense of Community

Public housing in its more conventional form has been anti-community. This was not due so much to an absence of concern for community when the program was first initiated as to mistaken assumptions forced upon the program by its enemies and the defensive posture of the Public Housing Administration and local authorities.

The mistaken assumptions lay in the notion that the simple substitution of physically sound structures of unified design, preferably on a large scale, under central management, populated solely by low-income families, would constitute a "community." Charles Abrams lists as "Fiction VII: Housing projects in slum areas must be self-contained and large enough to create their own environment." 6 Quoting James Ford, he says, "A large project it was thought would have an "increased chance of maintaining its distinctive character because its very size helps it to dominate the neighborhood and discourage regression." 7

Public housing developments in their traditional form contained many elements which functioned against the growth of a sense of community.
They excluded all but a narrowly defined class of poor families. People with strong inner resources who might have provided leadership and served as success models were generally excluded at the outset.

Those tenants that were reasonably able to perform in those roles usually became ineligible and were required to move away.

The project neighborhoods being strictly residential, of one class, without interspersing of institutions, shops, bars, etc., were sterile.

Not only was home ownership impossible, but tenure was dependent upon rules and regulations with little room for choice among tenants.

The very nature of centralized management discouraged tenant involvement in meaningful participation in project and community affairs.

In many but not all authorities rigid policies were established at the top level with practically no room for negotiation and interchange between tenants and management.

Under the pressures of urban renewal, highway development, and other public action, more and more tenants were living in public housing because they had to, rather than by choice.

2. Relationship Between City Government and Public Housing Residents

The second issue refers to the relationship between city government and residents of public housing/slum areas which have fallen into decay and where various rehabilitative programs have been initiated. When the response by residents to requests by city governments for their involvement in the planning process was negative, there were attitudes of apathy, hostility or cynicism.
Underlying these attitudes were distrust, an absence of confidence in city hall in particular, but of all levels of government as well. The source of distrust lies in the feelings of neglect, of being ignored. The proof of neglect is the poor quality of the more visible city services—inadequate garbage and refuse collection, filthy streets, broken pavements, abandoned buildings, littered vacant lots, insufficient or indifferent police protection.

The alienation of the people of the slums and ghettos is widely recognized today, and many new approaches and schemes for overcoming it are afloat. The community action programs under the Office of Economic Opportunity, neighborhood rehabilitation programs, decentralized city halls, neighborhood service centers, and "walking mayors"—all of these have some value. However, the most obvious approach has received little consideration; i.e., the way to the hearts of alienated people is through the heavy infusion of city housekeeping as well as health, welfare and educational services. To most low income people, city government means certain very basic functions relating to removal of refuse, street cleaning and repairing, police protection, etc. It may be contended that many people in the ghettos are hostile to the police and want less, not more "protection." Undoubtedly this does apply to the most hostile and rebellious elements. However, as the writer's survey of two large inner city Detroit public housing projects indicated, the main complaint against police pertained to quality of service, and the posture and style of policemen.

3. THE NEAR TERM SOLUTION

3.1 Security From What Dangers?

There are at least four basic physical dangers of vital concern to all family members of the public housing unit: crime, fire, accident and natural phenomena. Only the first of these threats—crime—will be discussed. No less important are the long-term social-economic evils which produce most of crime. Although an advantageous interface could occur between certain crime prevention systems and the reduction of other types of danger, such an interface must be left to sociologically-oriented research efforts.
In addition to the fact that protection of public housing projects by increasing the number of paid guardians is economically unfeasible, the cost of additional hardware or structural modifications to add significantly to the security of these locales would probably be prohibitive, or at least not very cost-effective. An approach that depends only on physical control of interpersonal contacts or of personal traffic through the structures as the sole solution to regulation of undesirable behavior is fated, in the end, to approximate the physical characteristics of prisons, asylums, or other "total institutions" whose rightful inhabitants suffer a degree of regimentation indistinguishable from the control imposed on "outsiders."

We maintain that a feasible solution to the problem of controlling crime in low-income, high-rise housing areas must combine traditional solutions. These would include better paid patrolling, and more secure physical structures, with a program designed to enlist the aid of the tenants of these structures in surveillance, in deterrence of crime, and, in general, regulation of their own and others' behavior.

All of the relevant factors will interact in a complex fashion to determine the probability of criminal acts occurring, with the critical aspects of this interaction little understood at this time. Some idea of the kind of structural-behavioral interactions that may occur can be gained from Jane Jacobs' "Life and Death of Great American Cities." A more graphic description of the functional social isolation of inhabitants of this type of housing is contained in a chapter of Hubert Selby's famous "Last Exit to Brooklyn."

3.2 The Taxonomy of Crime

Vandalism is the willful or malicious destruction, injury or disfigurement of public or private property without the consent of the owner. Broken windows and lighting fixtures, cutting of fire hose, defacement of building interior walls, and destruction of laundry and recreation room equipment comprise some of the categories of vandalism occurring in Detroit public housing. Many factors may explain vandalism, a distinct possibility being hostility against a feared or envied authority symbol; however, perhaps the most significant one is the age distribution of the occupants.
Exact data on the extent of vandalism are not easily available on a national scale. From records and discussions with various Detroit Housing people, it is evident that its incidence is extremely high in Detroit and public housing. In 1967 vandalism occurred in Detroit as 56% of total Part II* offenses. In the two Detroit precincts where two large public housing projects are located, vandalism was 26% and 25% respectively of all Part II offenses. Records for one of the two housing projects indicated that vandalism was 18-30 percent of all offenses reported for 1968.

In 1967 slightly over 60 percent of the charges filed for vandalism (nationally) were referred to the juvenile courts. The greatest arrests were in the age group of 13 and 14 years. The next most arrests were in the 11 and 12 year-old group and then the 10 and younger group.

Burglary

Burglary is either the forcible or unlawful entry of a structure with intent to steal. Of the 1,605,000 burglaries reported by the FBI in 1967, 49 percent were in residential areas, which gives about 90 burglaries in some kind of housing unit every hour of every day in the year. Reports on Detroit show that 48 percent of its burglaries affected residences. There is also evidence that, as security measures are proving a deterrence to crime in business and commercial establishments, crime in housing areas is increasing disproportionately. In the last four years, for example, Detroit's overall burglary rate increased 140 percent, whereas residential burglary increased 200 percent. Apartments in public housing constituted almost 70% of all targets. Doors and windows were the method of entry 90% of the time. Available data indicate that unattended apartments during daytime hours are becoming increasingly easy prey for the burglar. In Detroit in 1967 less than 5% of all reported stolen property was recovered by the police. Prevention and detection are most difficult for law enforcement agencies due to the tremendous volume of these

*Embezzlement and fraud, weapon possession, sex offenses, disorderly conduct and others.
offenses and the lack of adequate police patrols. Leading police experts in analyzing the problem agree that an innovative approach in improving the security of the targets of burglars will lead to a substantial reduction in this type of crime and will have immediate and lasting results.

Theft

Theft is the stealing, taking, leading, riding, or driving away of the personal property of another with intent to deprive. The type of thefts in public housing areas are auto, theft from auto, bicycles, and possibly purse snatching. For example, in 1967, of the total thefts in the United States (other than auto), 15 percent were bicycles, 20 percent were auto accessories, and 18 percent items in autos. Also, the large core cities, where public housing most frequently exists, exhibit double the theft incidence of suburban areas—913 versus 460 per 100,000 population, respectively. Even more dramatic is the almost four times greater rate of auto theft in the large core city. Generally, it has been found that two-thirds of thefts occur at night, and about one-half are from private residences and multifamily units and on fronting streets. The problem of theft is increasing.

For Detroit, theft has increased 55% since 1965; for the precincts where two large public housing units exist, the increase is 35-40%. Purse snatching and thefts of auto parts are a major street larceny problem in one of the largest Detroit housing projects. The term street larceny, is considered more meaningful since the group of thefts so identified generally occur within reach of police or housing guard patrols. Over the past three years the number of larcenies has uniformly doubled in Detroit and in the core areas where public housing projects are located.

Robbery

Robbery is the confrontation of a person, using of force or threat of force, with intent to steal. Although robbery has been increasing percentage-wise about equally
in both large core cities and surrounding suburban areas, it is about nine times more prevalent in the larger cities than in suburban areas. Compared with the percentages of robberies in banks--278 percent, service stations--123 percent, chain stores--156 percent, residential robberies only increased 64 percent in the 1960-67 period; however, this threat is formidable. Prime targets are walkways, parking areas, clothes-drying areas, and play areas, which are oftentimes obscured from view, unilluminated, or lost in the shadows of the buildings in the housing complex.

The robbery rate has increased 100% nationally over the last three years. In the Detroit core area housing projects the victims in many cases are the elderly residents. While the object of the attack is money and personal objects, this is also a crime of violence as the victims may suffer personal injury as the result of the strong arm attack. The victimizer in many of the cases are reported to be teen agers. Recent national figures indicate that 34 percent of the strong arm type which were cleared involved arrests of persons under 18 years of age.

**Assault**

Assault is the unlawful attack by one person on another for the purpose of inflicting bodily injury, including, for purposes of this paper, forcible rape. While specific crime data applicable to public, multi-family housing projects are difficult to extract, it is known that certain types of crime are virtually impossible to prevent with any kind of a patrol force or security system. Generally, these crimes are against a person, are committed behind doors, and involve people who oftentimes know each other. They include murder, rape and assault. Their frequency may be higher in public housing projects than in other urban housing sectors; for Detroit, assaults in 1967 comprised approximately 7.5% of all Part I crimes compared to an estimated 10-15% of all crimes reported from large Detroit public housing projects. However, these crimes are difficult to control anywhere in the city. The experiment conducted by the New York City Police
Department some years ago vividly demonstrates the effect that heavy "sight patrol" can have on such crimes as burglary, theft, auto theft, and robbery. However, although a dramatic decrease in these crimes was effected, the rate of murder, rape and assault remained almost the same. It is unrealistic to suppose that any kind of a security force, even if the funds and men were available, could radically alter this type of crime against a person in housing projects.

Since crimes of assault do occur in public housing projects, this element is explicitly included within the research consideration. Ways and means must be sought at least to mitigate incidences of assault. However, because of its private nature, research in this area could be hindered by the difficulty in determining the extent of such crimes and hence in finding a way to prevent them.

3.3 Tenant Response

Moreover, from the standpoint of tenants of the type of housing in question, there is little available information regarding their "naive" classification of crime, as contrasted with the standard classification scheme set forth above. For example, one aspect of the possible disparity between tenant attitudes and beliefs and those of "the Establishment," could center on the judged degree of "criminality" implied by some action. This kind of disparity would be an important factor in estimating willingness or motivation of tenants to become involved in controlling or deterring different types of behavior. That is to say, vandalism in the eyes of a housing authority or the police may constitute a quite serious crime problem, in that considerable property destruction may ensue; from the standpoint of the tenant, however, destruction of public property--equipment in the halls, basement, or courtyard of the housing authority--may not be perceived at the time as "criminal behavior" to any significant degree. Some examples follow.
A good example is the minimal amount of formal reporting of so-called "family disturbance" by tenants in a Detroit public housing project. The resident manager of a building, elected by fellow-tenants' popular vote, minimized the incidence of tenant assaults by a combination of discreet hallway patrolling and informally acting as an arbiter when so called upon by tenants. A negative factor which no doubt contributed to this tenant behavior was the alleged selective response of the local police precinct to calls from the project. The consensus was that the police would respond only to serious crimes, such as armed robbery, because of local precinct workload saturation.

These opinions seemed to be verified by the police records. The precinct in which the housing project was located had the highest crime rate per population for the more serious (Part I) crimes and the largest percentage growth in robberies (34.6%) as a percentage of total crime for a three year period. The corresponding arrest record per population for Part I crimes for this precinct was in the lower 50% ranking for all police precincts in Detroit.

Another tenant response attitude concerned their reluctance to press charges against teen-age residents for less serious Part I-type offenses, such as disorderly conduct, sex offenses and vandalism. Police records on apprehension of juveniles for the precincts where public housing is located indicate that less than 3% of all Part I offenses reported to the Housing guards result in a formal charge and apprehension by the police.

Another aspect of tenant response to criminal activity within the housing complex is the assessment of the probability that some type of criminal activity will occur in the future, based on the past record—particularly the subjective probability that the individual in question will be involved in such a criminal encounter. As recent psychological research has shown, man is a notoriously poor estimator of the probability of future events on the basis of the past; in general, there is an overwhelming conservatism in his estimation of likelihood, even with good information. Thus,
the frequency of a type of crime (for example, burglary) in a given housing unit may be at a level that would lead law enforcement officials to characterize the rate as a "crime wave." Because of the different perspective, and different assumptions (like "lightning never strikes twice..."), however, the tenants would continue to believe that the likelihood of individual victimization--particularly repeated victimization--is very low. As a result, they would remain relatively apathetic to programs attempting to enlist their support in better protecting their own personal property.

We found this problem confirmed by interviews with responsible officials in the public housing projects. Overcoming tenant apathy is very much dependent upon careful collection of proper data, to fit a scientifically designed format, followed by a credible presentation of facts to the tenants which illustrate the past threats to his security, and future predictions--based on frequency, locational, seasonal and diurnal vulnerability, attack profiles, and the like. Unfortunately, we found a serious shortcoming existed in the information service which precluded any chance for real success, given good intentions. The Housing Commission did not provide an objectively oriented reporting format, rather a blank page for subjective comments by personnel untrained in law enforcement and victimization analysis.

3.4 Target Areas of Crime

Multifamily housing projects have at least three prime targets. These are (1) persons, whether they be the occupant, visitor, or the building's operating personnel; (2) property, both fixed (building, land, and attached components) and personal (furniture, personal effects, automobiles, and so on); and (3) equipment, including washing machines, dryers, lobby services, and mechanical/electrical items found within structures, and recreational items usually located outside the building.
Where these targets for the vandal or criminal exist must be identified in any meaningful research. Four discrete areas are suggested and a fifth one is included that is much more general, but quite significant in nature. The first four locations—within the living unit, within the apartment building, within ancillary buildings, and on-site exterior areas—offer the most manageable elements from a research/decision-making/implementation standpoint, if for no reason than their single control by one agency or authority.

The threat of crime on adjacent public throughways and in other public neighborhood areas where housing tenants may be in the course of their daily activity or travel cannot be understated. For example, 1967 crime figures indicate 54 percent of robberies alone were committed on the streets. Nevertheless, research on crimes in the public areas seems indicated. There may be a good reason that suggests there should be a distinct demarcation between public and private (in this case, the project property) spaces; vis-a-vis walks, plazas, and play areas of the housing project merging indiscriminately with areas open to the public at large.

Any beneficial change in crime frequency and pattern in the public area is one which can be correlated with improvement in security measures. A hard-to-identify phenomenon of such improvement can be a crime switch from the public area to the contiguous non-project areas—on one hand decreasing the crime rate, on the other increasing the rate. The net total benefit could quite possibly be negative, thus denying the cost-effectiveness of the security measures employed in the public housing areas.

3.5 Measures to Control Crime

Three obvious objectives of control exist in dealing with the social symptoms which happen to be crime and violence; as described below, they imply the operational and structural requirements of a security system for three spatial categories: on-site exterior areas, within the building, and within the living unit.
CRIME AND PUBLIC HOUSING

1. Design the physical environment to minimize the amount of crime by making it inconvenient.

2. Design out certain crimes from high-rise buildings by use of visual control techniques.

3. Control the destructive activity within the buildings by means of materials impervious to permanent damage.

Six measures against crime can be identified as a series of events: deterrence, denial or resistance, identification and tracing, apprehension, recovery of property, and conviction. The first two measures are considered significant objectives of public housing crime control research without the necessity of bringing in all the complex interactions of the law enforcement agencies, prosecutor, courts sectors of the criminal justice system. Deterrence seeks to prevent the successful completion of the crime.

Typical research objectives which would clarify deterrence and denial systems are described below:

**Deterrence**

1. Automatic Alarm Systems
2. Patrol and Surveillance
3. Security Countermeasures Publicized
4. Legislation
5. Protective Lighting and Site Design to Emphasize Public View
6. Tenant Education

**Denial or Resistance**

1. Tamper-Proof Devices
2. Stronger Materials
3. Pre-entry Identification Monitoring
4. Time Delaying Protection Devices
5. Manually Operated Alarms
6. Intrusion Sensing Devices.
Inherent in the denial system is the "increase in the risk of capture"; accordingly, some security measures have dual purposes. For example, the established effectiveness of an alarm system makes it a deterrent; however, it can also be recognized as a means to thwart or deny crime when an attempt has been initiated. Another example is where a private (non-municipal) security patrol both deters crime and offers considerable resistance after the attempt. Even with New York City's force of about 28,000 uniformed police, the New York City Housing Authority has established its own security force of 1,200 personnel. The Authority believes that the residents of its housing are subject to less criminal activity than are those in other low income, private housing, which is mostly tenements. On the other hand, there is a disproportionate assignment of guards to maintain security. Contrary to the general rule, the occupants of the Authority's housing have a much higher ratio of police time available for their protection. Even at the cost of about $12,000,000 per year for the 1,200 special housing authority police, the positive deterrence and denial aspects are not clear. It should be noted here that the cost-effectiveness of this system, as opposed to alternative ones, is unknown at this time.

Very little formal study has been performed on the impact of crime on public housing. The existing force of New York City's Housing Authority police has grown to its current size by responding to the need for additional police protection. This is typical of police departments which have realized that a rising crime rate can be used to justify a demand for more personnel, better facilities and hardware, and better salaries.

Although the benefits remain unassessed, they may be considerable in cost/benefit terms. In addition to the cost of increased paid security forces for public housing developments, the presence of such forces in the buildings and surrounding areas may have unforeseen consequences, at least from the perspective of the tenants.
First, the presence of considerable numbers of such personnel may result in a perception by the tenants that "maximum feasible security" has been attained. In this case, there would probably be a further relinquishment of any responsibility for assistance in deterrence or surveillance on the part of tenants--and such feelings of responsibility are in many cases marginal at present.

Second, increased patrolling by identifiable, possibly armed security personnel will tend to influence the "atmosphere" of the housing area toward that of a prison-like institution. Inevitably, there must be mixed feelings on the part of the tenants; although most of them may recognize that the primary purpose of the patrols is to control criminal activity, there is the concomitant feeling that all behavior is being controlled. This would be particularly true if tenants were sometimes confronted by the patrolmen (who may not recognize them as tenants) for an accounting of their presence. Thus, the feeling on the part of the tenant that it is best he simply stay out of the way is intensified, with a corresponding reduction in the possibility that he would assume any share of interest or feeling of responsibility for aiding in surveillance and deterrence.

The three spatial categories shown in Exhibits I, II, and III constitute the housing domain which requires protection. Deterrent and denial system candidates which counter crime would have to demonstrate, as either active or passive agents, their effectiveness in terms of threat reduction, imperviousness to defeat, cost and timing, in minimizing crime opportunities.

The true test of effectiveness over time would depend on answers to several questions:

1. Are there statistically significant changes in the public housing crime rate due to use of security systems (given that the crime rate reflects efficient reporting systems and does consider the changes due to growth in population)? Also cultural changes?
2. Does the security system cause an improvement over time in the attitudes and fear of the residents of housing?

3. Is the apprehension rate a meaningful measure of how well the security system responds?
CRIME AND PUBLIC HOUSING

HOUSING UNIT

ENTRANCEWAYS
- Door to Hallway
- Door to Exterior
- Window to Exterior

COMMUNICATION
- To Hallway
- To Lobby
- To Other Tenants
- To Action Point
  (police, manager, security guard)

SECURITY ALARMS
- Covert/Audible
- Glass Breakage
- Ultrasonic
- Pressure Sensitive
- Light Sensitive

EXHIBIT I
WITHIN BUILDING

HALLWAYS AND STAIRWELLS

- Interior/Exterior Illumination
- Blind Spots
- Access by Non-occupants
- Surveillance

FIRE ESCAPES

- Access from Outside
- Door/Window Exits
- Roof Doors
- Visibility

GENERAL ENTRANCEWAYS

- Elevator
- Service
- Garage
- Coal Drops
- Ventilator System
- Sky Lights
- Sidewalk Elevator

LOBBY AREAS

- Illumination and Surveillance
- Accessibility and Night Keys
- Furniture
- Mail Boxes
- Vending Machines

LAUNDRY, STORAGE GARAGE, AND OTHER BUILDINGS

- Illumination
- Surveillance
- Blind Areas
- Tamper-Proof Constraints
- Coin Boxes

EXHIBIT II
4. THE LASTING SOLUTION

4.1 Crime Control Versus Prevention of Causes of Crime

The previous section dealt mostly with the theme of control of crime as a symptom of social ills--poverty, racism, etc. For candidate solutions to be feasible, a framework must be built of the defined crime threat and the economic, social and psychological constraints that face the housing sector. In addition, technology and systems must be projected through a long enough period of time, at least five years, in order to develop a broad array of possible solutions--by type, function and cost. Solutions would be demonstrated in terms of the methodology of systems analysis--benefit cost, economies of scale, and trade-offs among alternatives.

In finding ways to diminish crime and violence that might take place in public housing projects, the question arises whether there is any real chance of payoff for crime control systems considering the deplorable state of the people whose security is supposed to be enhanced and the historical record of failure and possible near-term collapse of public multi-family housing as an institution--cited in the opening sections of this paper.

The second question follows from the first one. Why spend money on palliative measures which may enjoy a small chance of meaningful success if the cause of crime is not at the same time being prevented. It does seem more logical to treat the cause, not the consequences.

The danger in treating only consequences and not doing anything about cause was noted by a HUD official more than three years ago when a chance for near term payoff seemed possible:

"In these ways we can diminish the violence that might take place, but we will really not be doing anything about the prevention of the cause of the crime. In fact, we will find ourselves living in a state of
4.2 The Future of the Cities - An Armed Camp

A more recent national study on crime, "The Future of the Cities--An Armed Camp," released November 24, 1969 by the National Commission on the Causes and Prevention of Violence, has emphasized that homicide, assault, rape and robbery are primarily centered in the large cities and that the causes are sociological, not racial.

"When poverty, dilapidated housing, high unemployment, poor education, overpopulation and broken homes are combined, an interrelated complex of powerful criminogenic forces is produced by the ghetto environment. These social forces for crime are intensified by the inferiority-inducing attitudes of the larger American society--attitudes that today view ghetto blacks as being suspended between slavery and the full rights and dignity of free men."

The Commission offered the following judgments about the reasons for the true increase in crime that cast serious doubts on the ability of traditional institutional control to effectively prevent further increase in crime:

1. The rapid social change in the United States has "led to a breakdown of traditional social roles and institution controls over the behavior of young and old alike, but particularly the young."

2. There has been a breakdown in the public belief, found especially in urban slum areas, that rule-making institutions are entitled to rule.

The following is an excerpt from the report indicating the frightening future of American cities if rapid, massive social action is not taken.
"The way in which we have so far chosen to deal with the deepening problem of violent crime begins to revise the future shape of our cities. In a few more years, lacking effective public action, this is how these cities will likely look:

"Central business districts in the heart of the city surrounded by mixed areas of accelerating deterioration, will be partially protected by large numbers of people shopping or working in commercial buildings during daytime hours, plus a substantial police presence, and will be largely deserted except for police patrols during nighttime hours.

"High rise apartment buildings and residential compounds protected by private guards and security devices will be fortified cells for upper-middle and high-income populations living at prime locations in the city.

"Suburban neighborhoods, geographically far removed from the central city, will be protected mainly by economic homogeneity and by distance from population groups with the highest propensities to commit crimes.

"Lacking a sharp change in Federal and state policies, ownership of guns will be almost universal in the suburbs, homes will be fortified by an array of devices, from window grills to electronic surveillance equipment; armed citizens in cars will supplement inadequate police patrols in neighborhoods closer to the central city, and the extreme left-wing and right-wing groups will have tremendous armories of weapons which could be brought into play with or without any provocation.

"High speed, patrolled expressways will be sanitized corridors connecting safe areas, and private automobiles, taxicabs and commercial vehicles will be routinely equipped with unbreakable glass, light armor and other security features. Inside garages or valet parking will be available at safe buildings in or near the central city. Armed guards will "ride shotgun" on all forms of public transportation."
"Streets and residential neighborhoods in the central city will be unsafe in differing degrees and the ghetto slum neighborhoods will be places of terror with widespread crime, perhaps entirely out of police control during nighttime hours. Armed guards will protect all public facilities such as schools, libraries and playgrounds in these areas.

"Between the unsafe, deteriorating central city on the one hand and the network of safe, prosperous areas and sanitized corridors on the other, there will be, not unnaturally, intensifying hatred and deepening division. Violence will increase further, and the defensive response of the affluent will become still more elaborate.

"Individually and to a considerable extent unintentionally, we are closing ourselves into fortresses when collectively we should be building the great, open humane city-societies of which we are capable."

4.3 The Future of the Cities - The Humane City Society

As the National Commission indicated, there are alternatives to its gloomy predictions if the nation alters its priorities and takes the massive actions that are required to launch a full-scale war on domestic ills.

In order to effect a basic change in the security of inner city dwellers and prevent the causes of crime and violence, three objectives have been suggested by an urban agency which directly reflect on housing and the housing occupants.

1. **Shelter Supply** - Adequate and increased choices, of acceptable quality, of varied design and dispersed location, conveniently located to transportation, job opportunities, shopping facilities, schools, social services; of economic cost, with subsidy to the household that requires it.
2. Development of Community - A welcoming, non-threatening social environment that is stable and stabilizes; that permits realization and identity of self-worth; that encourages contributions to home and neighborhood maintenance, that makes the housing community a part of decision-making local institutions and services, that sets viable community standards of behavior for its occupants.

3. Strengthened Individual and Family Life - With Objectives 1 and 2 as prerequisites; an increased independence and competence, fostered by comprehensive and coordinated multi-service programs, a freedom from institutional control, yet a close liaison with and cooperation from all agencies which sponsor a humane life.

The accomplishment of these objectives contextually involve the 'city'--its history, nature and cycle of growth. A few, final comments will be made citing the magnitude of the problem of achievement.

Lewis Mumford\(^\text{16}\) feels that the economists and sociologists who project urban expansion on the basis of speeding up technological forces now at work will "tend to arrive at universal megalopolis, mechanized, standardized, effectively dehumanized, as the final goal of urban evolution." He felt that the prospective development of cities today is rooted in ideological assumptions hostile to man's nature and destiny.

"Beneath its superficial regard for life and hearth lies a deep contempt for organic processes that involve maintaining the complex partnership of all organic forms, in an environment favorable to life in all its manifestations. Instead of regarding man's relation to air, water, soil and all his organic partners as the oldest and most fundamental of all his relations--not to be constricted or effaced, but rather to be deepened and extended in both thought and act--the popular technology of our time devotes itself to contriving means to displace autonomous organic forms with ingenious, mechanical (controllable; profitable!) substitutes."
This prediction of ecological disaster impacts the lives today of more than 58 million dwellers within central cities. It makes quite clear the consequences of not pursuing the means, amongst other things, to prevent the causes of crime and violence—not only affecting the security of the minority, the residents of public housing, but the very lives of all dwellers within the urban centers of the United States.
FOOTNOTES AND BIBLIOGRAPHY


The distribution of medical care across individuals and groups of the population in the United States shows striking variations in quantity, quality, and accessibility. Since medical care is believed by most persons to contribute importantly toward the maintenance of health and function, both valued characteristics, one must assume that the inequality of its distribution represents an equilibrium resulting from the interplay of societal allocation mechanisms, the interests of care providers, and the variation in bargaining power among would-be consumers. Since the United States has neither a monolithic nor an integrated system of producing, allocating and distributing medical care, one must seek to identify all the relevant parties, their goals and strategies, and the pattern of their interactions to understand the existing situation and to devise effective moves toward improving the de facto system. Such a project lends itself to interest group and game analysis, though the empirical complexity presents difficulties for actual simulation. Not only do the various sets of "players" compete with one another; conflict goes on within player sets, and indeed within individuals among the inconsistent goals which one man may espouse.

The relative contribution of good medical care to preserving and/or restoring health and to preventing disease is uncertain, since many other environmental factors affect morbidity and mortality for individuals and populations. Nutrition, employment satisfactions and security, a sense of political justice and so on all play a quantitatively indeterminate but probably significant role. Medical care represents an adjustment of the interaction between human biology and the total environment, a corrective or at best a supportive

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intervention. Since the origins of illness are sometimes unknown, usually multiple and technically difficult to understand, medical care as a cure for existing illness is seen by most laymen as a more essential service than programs to alter the pathogenicity of the environment. The extent to which the social system makes such care available to sick persons thus tends to correlate highly with the overall valuation of the particular individual or group. Medical care becomes important not only in its own right, therefore, but also as a measure of how much one is valued by the society. The latter judgment is a major determinant of one's self-valuation. The distribution of medical care thereby has implications for the physical, mental, and "social" health of a society's members.

Figure 1 charts "the players and their goals". Each "player" group is a set of individuals (or institutions) all of whom perform the same function vis-a-vis the medical care system. The list of players consists of rather broad categories, and one may well argue that each "player" represents a heterogeneous collection. The chart attempts to identify the major goals, or motivations, which are functionally linked to the role of each player. Since several such goals exist for each player, it is obvious that some of the individuals in each category will value the goal differently from their colleagues. Subsets of players will thus arise. Detailed studies of any given player-group, such as physicians, would necessarily probe these finer differentiations. For the purpose of the model being proposed, I will remain at the level of analysis shown. Sixteen players (total number of subclasses, see figure 2) are enough, if not too many, for a first approximation.

The model accepts the notion that there is a "power elite" which has tremendous influence over societal decision-making, and whose calculations aim at building the militarily and economically strongest society at the lowest possible resource cost. The elite are not assumed to be malevolent, but highly rational in the use of scarce overall
resources toward achieving their major goals. From the point of view of such leaders, medical care for others than themselves should be produced as cheaply as possible and distributed to as few people as possible consistent with military and economic strength and the maintenance of internal stability. Since medical care is a valued commodity, the power elite will wish to control its availability for use as a reward and its withdrawal as a potential punishment. Changes in societal circumstances may of course, force the elite to distribute care more and more "liberally". The economics of affluence may even cause them to use medical care production to provide employment and mobility opportunities for dissident groups.

The "Humanitarians", by contrast, are defined by their goals, which in the area of medical care are highly humane and universalistic. "Humanitarians" are concerned for the health and happiness of all members of the society (and presumably of the world), including that of the workers in the medical care system. They also tend to see military and economic goals as secondary to those of achieving the most happiness for the most people. The societal leaders work toward their goals through the manipulation of the social system by powers at their disposal; the "Humanitarian" in general must seek to influence the perceptions, values, and subsequent actions of any and all of the other players.

The providers of care are broken into two usually quite distinct groups: individual practitioners and institutions. The only common case of blurring is the merging of interests of proprietary hospitals and those practitioners who own and use them. Otherwise, physicians and other practitioners are concerned primarily with their conditions of work, with opportunities to achieve their fullest possible professional functioning, to have as high and secure an income as is consistent with their other goals, and to enjoy mutually trustful and respectful relationships with their patients. One of the goals listed for practitioners also implies that they derive some sense of their own significance from that of the persons whom they treat. Some differences of goal appear among practitioners, depending on the setting in which they work. The goals of the self-employed and the practitioner in corporate groups which
share earnings are significantly different from those of institutionally salaried men. The exact relationship between the physician's work and his earnings is both a highly conflicted subject currently and a highly promising area for identifying the optimal pattern of treatment for greatest care efficiency and maximal disease prevention.

Care-providing institutions vary in the division of control over policy-making between physician staff and lay boards. Proprietary hospitals are owned and run by the physicians who practice in them. Military-type hospitals, at the other extreme, are controlled policy-wise, by the Congress and the Commander-in-Chief. Voluntary hospitals - those which have been sponsored by particular groups of private persons - range between, with very strong and knowledgeable trustees clearly in charge in some cases. All of the institutions share the goals of economic efficiency, but their relationship to the population served varies strikingly. Proprietary hospitals need paying patients or those fully covered by insurance; the patients' origins are otherwise of no interest to the institution. Military-type hospitals serve strictly specified populations, and no person falling outside the eligible group can receive care in them. Voluntary hospitals have been built to care for the sponsoring groups and others of their choosing. To allow for the temporal variations in bed need, however, such groups naturally prefer to build their hospitals slightly larger than what is necessary to meet the average need. To avoid the inefficiencies of low occupancy and to qualify as charitable institutions, however, such hospitals commonly open their doors to "charity" cases. For optimal functioning in this respect, there should always be a surplus of "unmet need" among the poor, which will guarantee the voluntary hospitals their choice of occupancy rates. Those voluntary hospitals, of course, which are also teaching hospitals share the goals to be discussed below under "training institutions".

Every person filling any of the roles listed is also, at times, a consumer of care. This obvious fact causes much of the confusion associated with recent Federal laws which require various levels of "consumer participation" in state and local program formulation. The consumers implied by the chart are primarily the great majority of the population who
do not fill any of the other player roles, though there is probably a considerable overlap between the "high-share" group and the "power elite". All consumers presumably wish to have easy access to the best possible care at the lowest possible price, for themselves and for others whom they value. This latter category is not homogeneous; that is, individuals sharply differentiate between those few persons, usually family members, for whose medical care they are willing to spend whatever resources they can to restore health and those for whom they would be willing to give only a little. At one end of this dimension are those others for whom the individual will not willingly expend anything, even to save their lives. The expression of such differentiation on a societal scale will receive further attention below as a case study.

Conflicts among consumers center even more basically on the common and probably correct perception that there is an inadequate supply of medical care to serve the entire population. Given such an objective reality and common knowledge of it, it is inevitable that consumers at one level will perceive gains by others as direct threats to their own supplies, even if the total supply is gradually expanding. High-share consumers undoubtedly wish to preserve their own status quo. Whether they are willing to pay more taxes to expand the total supply and therefore the care available to low-share consumers depends on their values and their perceptions of the possible. Few will willingly diminish their own supply to benefit others.

The middle-share consumers must worry simultaneously about increasing their own share and protecting what they already have against the encroachment of those less well-off. Some may additionally feel the psychological necessity of keeping a constant differential between them and the groups they perceive as inferior socio-economically, such that improvement in the situation of the low-share group, even when it does not worsen their own share, causes them acute discomfort through its "relative equalization".

The goals of the low-share group must, in general, be less complex, though their actual medical care situation is far worse.
They need and want more care and must either gain control of more resources with which to purchase and/or produce it, or else persuade other consumer groups in the society-at-large to redistribute the existing supply. Consumer groups will often thus perceive each other as the cause of their own inadequate and/or insecure supply of care, and this conflict will obscure the other forces at play. Indeed it may be stimulated by the other players for that purpose.

The institutions which train physicians, nurses, medical technicians, etc. require basically three kinds of supplies: (1) trainees with the necessary potential, (2) funds for training faculties, facilities, and equipment, and (3) "teaching material". Needs for the last involve these institutions in the direct delivery of medical care, or else their close affiliation with service programs. "Teaching material", of course, refers to patients whose diagnosis, treatment, and general care are observed and participated in by the trainees as an essential component of their professional education. The technical, impersonal nature of such contact is implicit in the term. Traditionally the poor have provided the great majority of "teaching material." In recent years in the U.S., because of increasing insurance coverage, more and more "private" patients have found themselves also receiving attention from trainees. Assuming that this trend will continue, teaching institutions will have less concern about adequate supplies of "teaching material" since all patients will fall into this category, hopefully with a more humane connotation. A similar discussion applies to subjects for medical research at such institutions. Given proper scientific and ethical control of the research, all patients will presumably be available for it, though the testing of new therapeutic agents will undoubtedly continue to fall most heavily on persons whom the society values less than the average and over whom it has coercive powers.

Finally, there is the group of third-party payment sources which reimburse the providers of care for services rendered to their beneficiaries. All third-party payers naturally are in a position to want the best care for their money, and the most effective preventive care. The private, profit-making insurance carriers differ strikingly from the governmental sources of
coverage, however, especially in the nature of the population groups covered. The private carriers seek the lowest-risk subscribers who must also be able to afford their premiums; most government programs cover the highest risk and almost always very low-income persons.

The "non-profit" insurance programs vary a great deal in their structure and purposes. An example may serve to demonstrate this point. Until recent years, few Blue Cross plans covered the cost of out-patient diagnostic rehabilitative therapeutic services, but did reimburse such work when performed on an in-patient basis. Such a policy would appear to have raised the cost to the carrier. Only when one realizes that Blue Cross is an instrument of the hospitals themselves does the explanation that this policy helps keep high occupancy rates by paying patients become both plausible and apparent.

These then are the players and their goals. The goals of one player sometimes are in direct conflict with those of another; sometimes goals of one player are of no direct interest to the others. In Figure 2 is a diagram of all the possible two-at-a-time interactions between players. The real interaction matrix is much more complex, of course, and would include not only the various possible multi-player interactions, but also the pattern of relationship around each goal. Figure 3 details the complete set of two-at-a-time interactions between the self-employed practitioners and each of the other players. In order to have entries for most of the cells, the examples of consensus and conflict between the two-player sets focus on a variety of goals. Perusal of Figure 3 will undoubtedly arouse some disagreement based on the fact that not all self-employed practitioners would be in conflict or share the consensus noted. This point would be well-made and well-taken. I have already acknowledged the heterogeneity of player-groups, and this characteristic may be at its most striking for self-employed practitioners. Another level of complexity is thus added to the analysis. The point of Fig. 3 is to demonstrate that there are areas of congruence and of conflict between any two players, and that in real life, exclusive focus on one or the other is probably a destructive distortion.
For the sake of exploring the potential usefulness of the analytic categories suggested thus far, the rest of this paper will examine in some detail past and predicted effects on the various players of movement from a situation of health care scarcity to one of adequacy or surplus. Such a transition reverberates through the system in many ways, not all of them positive even for the low or middle share consumers. To demonstrate the implications of the analysis most forcefully, the condition of the players under the scarcity situation will be compared with it under surplus. All factors involved in the production of care-personnel, facilities, supplies - are assumed to be either in deficit or excess. This comparison is chosen not only as a hypothetical test case; it represents the historical progression in now industrialized nations, though in few if any has a real surplus developed.

The societal context of developments affecting medical care abundance is briefly summarized in Figure 4. Each of the developments listed has affected the medical care system in a particular fashion; many of these points have been made in a recent paper by Veney. The growth of science and technology generally has both helped advance biomedical science and therapeutic capabilities and has been the base of industrialization and the movement from general scarcity to general surplus. Urbanization has resulted from and interacted with industrialization to produce the changes in mortality, natality, and age structure commonly known as the "demographic transition". The same factors have led to a profound change in the character of the labor force and the costs associated with training needed workers. The importance of medical care as a protection for human investments has risen steadily, along with biomedical capabilities and the societal surplus allocable to the medical care system.

Social class differentials have narrowed in modern Western Society from the gap between king and peasant to that separating corporate leader and skilled workman; differentials in access to medical care have likewise diminished. Significant changes in political process, methods of social control, and commonly held perceptions of the way the world is and other people are have also occurred, though they have progressed to the right-hand extreme on each line of Figure 3 in very few cases. Of
great importance for medical care distribution is the changing perceptions of it from a market commodity to which only those with adequate resources should be entitled to a necessary human support which must be available even to the most impoverished and/or alienated members of a society.

Related to the developments in biomedical technology, but also as an accompaniment of changes in practitioner and public perceptions, is the transition in modern medical care from a focus on curative efforts to one on prevention. The increasing prominence of chronic, partially preventible disease in the burgeoning older population also contributes to this shift.

The multiple changes in society and medical care have been graphically reflected in the gradual expansion of eligibility for good care. An interesting paradox exists in the area of priorities for medical care. The physician supposedly, by his Hippocratic oath and subsequent tradition, makes himself equally available to all who are in need of his services. American society, and indeed probably every other society until very recently, has in fact allocated sharply differing amounts of care to persons with differing characteristics. The dramatic growth of medical capabilities has had, among its by-products, the widening of the gap between the care received by society's most valued members and its least, although the proportion of persons falling into the latter category has decreased. The mechanism which has allowed this apparently incompatible co-existence has been the dual system of care, which still exists almost everywhere in the U.S. today. By it, the physician treats both rich and poor, but not rich and poor alike. He treats the rich in his office and the poor in the hospital out-patient department. He is the same physician, and at best he provides the same quality of technical expertise in both settings. The similarity ceases at this point, and I do not think I need to detail the differentials between the two tracks of the system. The different manner in which care is provided insures levels of utilization compatible with the system's priorities. For the physician, however, the exquisitely sensitive and painful choice of priorities is avoided.
The society-at-large, through its mechanisms for distributing wealth and through special legislative programs which assure care to particular functional groups, sets sharp criteria for who gets how much medical care of what quality. Figure 5 demonstrates empirically the evolution in the United States of such societal allocation mechanisms and priorities. Those in control of the society - by definition its leaders - preserve the best care for themselves and for those persons employed in implementing their societal goals as discussed above. The sequence of programs in Figure 4 is in fact a sequence over time. The Public Health Service, for example, was established in 1798 to provide care for merchant seamen while the Comprehensive Health Planning and Regional Medical Programs, which are supposed to bring the benefits of the best in modern medical care to all, were legislated in the past five years. An interesting detail of the figure concerns care for women of childbearing age. Half a century ago, concern was for minimal reproductive wastage; today it is for minimizing "excess births". The shift mirrors very closely the economy's transition from one which still had need of the reserve army of unskilled labor to one which must invest heavily in each child born for him to become a productive worker and a constructive member of the society.

Movement toward a situation where resources are available to produce adequate care for all will obviate the need for continuing the two-track system. Abolition of the double track is, in fact, absolutely required if the government is to play an increasing role in the delivery of care. Otherwise, the same institution which set the priorities of life and death among individuals would be implementing those priorities, an intolerable situation. Even if the government remains removed from the direct delivery of care, the dual system will have neither function nor justification nor political viability as the society finally can and does make available resources to all with which to purchase first-class care.

Another feature of moving into a setting of sufficiency should be the switch-over to preventive care, since enough resources will be at hand both to deal with the total need for acute care and to make the investment for prevention which will not yield benefits, in most cases, for some years.
The effects on the various players of the transition from a situation of scarcity in the total care supply to one of surplus is shown in Figure 6, which attempts to construct a sort of payoff matrix. The examples given are chosen rather at random, and of course the complete matrix would have to include all gains and losses to each player. Figure 6a attempts to look at all the advantages and costs inherent in both settings for one set of players - physicians in private practice. Undoubtedly other entries could be made to this table. A detailed examination of the figure will identify certain ways in which the transition will benefit physicians, others in which it will harm them, and others in which the gains and losses are finely balanced within each setting, so that the overall effect of the transition is unclear.

The analysis completed thus far is clearly the barest beginning of a full-fledged simulation. While further development of such a scheme might yield some new theoretical constructions or provide an empirical test for existing theory, my own interest in it relates to its potential usefulness in "tinkering" with the system, through providing as full an understanding of it as possible. To mediate useful change, one should be in the strongest position if he understands the goals and concerns of both proponents and opponents to given proposals. Perhaps further development of this scheme can bear some practical fruit by facilitating the improvement of medical care and hopefully health status for all members of society.
1. For documentation, see "Health and Well Being" by Philip Lee, in SOCIAL GOALS AND INDICATORS FROM AMERICAN SOCIETY, Annals of the American Academy of Political and Social Science, September 1967; pp. 193 - 207. See also the publications from the National Center for Health Statistics.

2. For description of the philosophical and legislative development of various medical care programs in the U.S. see for example "The Evolution of Medicare...From Idea to Law" by Peter A. Corning, Research Report No. 29 of the U.S. Social Security Administration; Washington, 1969; and "Public Health - Inside or Outside the Mainstream of the Political Process? Lessons from the Passage of Medicaid" by Betty J. Bernstein, paper delivered at a meeting of the American Public Health Association, Philadelphia, Penna., November 1969.

3. The concept of supplies necessary to health and well-being is that of Gerald Caplan, as described in 'PRINCIPLES OF PREVENTIVE PSYCHIATRY', Basic Books, New York, 1964. See pp. 31 ff.


I. "Power elite"
(Plutocrats, military and scientific leaders, legislators, etc., and their technical staffs)

1. Maximal military fitness of population
2. Maximal per capita productivity
3. Minimal care cost for general population
4. Control over resource use and care access
5. Minimal care production consistent with societal stability (in scarcity setting)
6. Maximal use of care production system for job and social mobility for the dissident (in sufficiency and surplus settings)

II. "Humanitarians"
("Philanthropists", "liberals", "Utopians")

1. Optimal care for all societal members
2. Maximal job satisfactions for all workers in the medical care production system
3. Minimal cost of care consistent with "1" and "2" above
4. Optimal health of all societal members
5. Per capita productivity consistent with "4"
Fig. 1 (Cont. 2) - The Players and their Goals

III. Providers of care

A. Practitioners

a. Practice consistent with internalized professional norms
b. Maximal control over conditions of work
c. Freedom from sanction-bearing evaluation
d. Freedom from competition with colleagues
e. Maintenance of mutual trust with patients
f. Service to maximally "important" patients

1. Self-employed
   i. Maintenance of "seller's market"
   ii. Maximal income consistent with "a-f"
   iii. Opportunity to donate "charity" care

2. Corporate groups (earning shares)
   i. "i-iii" above
   ii. Control over hours and patient loads

3. Institutionally employed (fixed salaries)
   i. Maximal "interest" of patients seen
   ii. Maximal salaries negotiable
Fig. 1 (Cont. 3) - The Players and their Goals

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<th>III. Providers of care</th>
<th>IV. Consumers of care</th>
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<td>B. Institutions</td>
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<tr>
<td>a. Maximal efficiency of operation</td>
<td>1. Maximal ease of access to optimal care for self and valued others</td>
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<td>b. Meeting minimal standards required</td>
<td>2. Minimal cost of such care</td>
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<td>c. Minimal costs consistent with &quot;a-b&quot; above</td>
<td>3. Minimal resource sharing (taxes, etc.) for care to non-valued others</td>
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<td>1. Proprietary</td>
<td>A. High-share</td>
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<td>i. Maximal volume of operation</td>
<td>a. Preservation of own status quo</td>
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<td>ii. Maximal affluence of patient population</td>
<td>b. Improvement of own access to best care</td>
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<td>2. Voluntary</td>
<td>B. Middle-share</td>
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<td>i. Optimal care for sponsoring group</td>
<td>a. Improvement of own access to good care</td>
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<td>ii. &quot;Excess capacity&quot; as security factor and for usual use in &quot;charity&quot; care</td>
<td>b. Protection of own share from encroachment by low-share groups</td>
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<td>3. Military</td>
<td>C. Low-share</td>
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<tr>
<td>i. Optimal care to beneficiary group</td>
<td>a. Improvement of own access to good care</td>
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### V. Training institutions
1. Adequate supply of best-quality trainees
2. Adequate facilities, faculties, supplies
3. Adequate "teaching material"
4. Adequate supply of "research cases"
5. Ties to "community facilities" for trainee placements, specialty referrals, etc.

### VI. Third-party payment sources
1. Maximal cost-effectiveness of care bought for beneficiaries
2. Minimal incidence of care-requiring conditions among beneficiary population

- **A. Private insurance carriers**
  - Recruitment of maximum number of lowest-risk subscribers at maximum premium

- **B. Non-profit carriers**
  - e.g. Blue Cross
  - Goals vary with sponsoring group; e.g. Maximal hospital utilization by paying patients

- **C. Governmental programs for specified groups**
  - Minimizing number of eligible persons
I. "Power elite"
II. "Humanitarians"
III. Providers of care
   A. Practitioners
      1. Self-employed (Fig. 3)
      2. Corporate groups
      3. Institutional
   B. Institutions
      1. Proprietary
      2. Voluntary
      3. Military

IV. Consumers of Care
   A. High-Share
   B. Middle-share
   C. Low-share

V. Training institutions

VI. Third-party payors
   A. Private carriers
   B. Non-profit carriers
   C. Governmental

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</table>

**FIG. 2 - THE INTERACTION MATRIX**
Fig. 3 - A Row from the Interaction Matrix
(Examples of consensus and conflict among sets of players)

### IIIAI Self-employed practitioners

<table>
<thead>
<tr>
<th>Consensus Area</th>
<th>Conflict Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. &quot;Power elite&quot;</td>
<td>Best care to elites</td>
</tr>
<tr>
<td>II. &quot;Humanitarians&quot;</td>
<td>Physician-patient trust</td>
</tr>
<tr>
<td>III. Providers of care</td>
<td>High quality of care</td>
</tr>
<tr>
<td>A. Practitioners</td>
<td>Physician control</td>
</tr>
<tr>
<td>2. Corporate group</td>
<td>Over work conditions</td>
</tr>
<tr>
<td>3. Institutional</td>
<td></td>
</tr>
<tr>
<td>B. Institutions</td>
<td>Quality of practice</td>
</tr>
<tr>
<td>1. Proprietary</td>
<td>High volume of patients</td>
</tr>
<tr>
<td>2. Voluntary</td>
<td>Need for best equipment</td>
</tr>
<tr>
<td>3. Military</td>
<td>Care to veterans</td>
</tr>
<tr>
<td>IV. Consumers of care</td>
<td>Need for mutual trust</td>
</tr>
<tr>
<td>A. High-share</td>
<td>High income for M.D.'s</td>
</tr>
<tr>
<td>B. Mid-share</td>
<td>M.D. independence</td>
</tr>
<tr>
<td>C. Low-share</td>
<td>Good care for all</td>
</tr>
<tr>
<td>V. Training insts.</td>
<td>Post-graduate education</td>
</tr>
<tr>
<td>VI. Third-party payors</td>
<td>Broader coverage</td>
</tr>
<tr>
<td>A. Private carriers</td>
<td>Non-interference</td>
</tr>
<tr>
<td>B. Non-profit &quot;</td>
<td>Against over-utilization</td>
</tr>
<tr>
<td>C. Governmental</td>
<td>Payment for services</td>
</tr>
</tbody>
</table>
Growth of science and technology generally.
Industrialization.
Material scarcity-to-sufficiency-to-surplus.

Urbanization.
Demographic transition.
Philosophy change from "be fruitful and multiply" to family planning.
"Reserve army" of unskilled, illiterate, cheap labor to highly skilled,
educated, expensive personnel (cf. Veney).

Psychology of fear and competition to one of security and cooperation.
Social control by repression to control by remediation.
Autocracy-to-oligarchy-to-democracy.

Growth of biomedical science and therapeutic capabilities.
Expansion of societal resources allocable to medical care.
Diminishing differentials in access to medical care.
Focus on curative to focus on preventive strategies of care.
Fig. 5 - Priorities for Medical Care, by Population Sub-groupings

<table>
<thead>
<tr>
<th>Sub-population</th>
<th>Means for implementation in the U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Health of the societal leaders</td>
<td></td>
</tr>
<tr>
<td>A. Optimal personal care</td>
<td>High purchasing power in the market</td>
</tr>
<tr>
<td>B. Minimal environmental hazard</td>
<td>&quot;Public health&quot; programs</td>
</tr>
<tr>
<td>1. Communicable diseases</td>
<td>Control of smallpox, TB, VD, etc.</td>
</tr>
<tr>
<td>2. Water, food, air impurity</td>
<td>Chlorination, inspection, etc.</td>
</tr>
<tr>
<td>3. Deviant behavior</td>
<td>State hospitals, community centers</td>
</tr>
<tr>
<td>II. Health of military</td>
<td></td>
</tr>
<tr>
<td>A. Active service members' care</td>
<td>Military medical care system</td>
</tr>
<tr>
<td>B. Guaranteed lifetime care for service-sustained disability</td>
<td>VA medical care system</td>
</tr>
<tr>
<td>III. Health of economically active</td>
<td>Market, company and union clinics</td>
</tr>
<tr>
<td></td>
<td>(proportional to skills-cf. Veney)</td>
</tr>
<tr>
<td>IV. Care for child-bearing women</td>
<td></td>
</tr>
<tr>
<td>A. Minimal reproductive wastage</td>
<td>MCH and MIC programs</td>
</tr>
<tr>
<td>B. Minimizing &quot;excess births&quot;</td>
<td>Children's Bureau and OEO programs</td>
</tr>
<tr>
<td>V. Care for the &quot;deserving poor&quot;</td>
<td>MAA, AB, AFDC, APTD</td>
</tr>
<tr>
<td>VI. Care for the elderly</td>
<td>Kerr-Mills, Medicare</td>
</tr>
<tr>
<td>VII. Care for &quot;undeserving poor&quot;</td>
<td>Medicaid, OEO, etc.</td>
</tr>
<tr>
<td>VIII. Good care for all</td>
<td>CHP, RMP, etc.</td>
</tr>
<tr>
<td>IX. Good health for all</td>
<td>Social systems planning</td>
</tr>
</tbody>
</table>

GLOSSARY

TB = tuberculosis
VD = venereal disease
VA = Veterana' Administration
MCH = Maternal and Child Health
MIC = Maternity and Infant Care
OEO = Office of Economic Opportunity

CHP = Comprehensive Health Planning
RMP = Regional Medical Programs
AFDC = Aid to Families with Dependent Children
MAA = Medical Aid to the Aged
AB = Aid to the Blind
APTD = Aid to Partially and Totally Disabled
### Care Scarcity Setting

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Low costs</td>
<td>Instability</td>
</tr>
<tr>
<td>Change-pressure</td>
<td>Inequity</td>
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### Care Surplus Setting

<table>
<thead>
<tr>
<th>Advantages</th>
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<tr>
<td>Stability</td>
<td>Resource loss</td>
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<td>Equity</td>
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<table>
<thead>
<tr>
<th>I. &quot;Power elite&quot;</th>
<th>II. &quot;Humanitarians&quot;</th>
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<td>&quot; &quot;</td>
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<tr>
<th>III. Providers of care</th>
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<tbody>
<tr>
<td>A. Practitioners</td>
</tr>
<tr>
<td>1. Self-employed</td>
</tr>
<tr>
<td>2. Corporate grps</td>
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<tr>
<td>3. Institutional</td>
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<td>B. Institutions</td>
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<tr>
<td>1. Proprietary</td>
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<tr>
<td>2. Voluntary</td>
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<td>3. Military</td>
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<tr>
<th>IV. Consumers of care</th>
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<tr>
<td>A. High-share</td>
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<tr>
<td>B. Middle-share</td>
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<tr>
<td>C. Low-share</td>
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<tr>
<th>V. Training Insts.</th>
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<tbody>
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<td>Teaching</td>
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<table>
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<th>VI. Third-party payors</th>
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<td>A. Private carriers</td>
</tr>
<tr>
<td>B. Non-profit</td>
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<tr>
<td>C. Governmental</td>
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* Assume income levels of population remain constant
Fig. 6a - A More Comprehensive Payoff Matrix for One Set of Players

(Example is that of physicians in private practice, solo or group)

<table>
<thead>
<tr>
<th>Characteristic of practice</th>
<th>Scarcity of Care</th>
<th>Surplus of Care</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Advantage</td>
<td>Cost</td>
</tr>
<tr>
<td>Supply of patients</td>
<td>Abundant</td>
<td>Pressure</td>
</tr>
<tr>
<td>Choice of patients, by illness</td>
<td>Possible</td>
<td>-----</td>
</tr>
<tr>
<td>Need to set priorities</td>
<td>Ad lib</td>
<td>Time lack</td>
</tr>
<tr>
<td>Technical interest of patients</td>
<td>Possible</td>
<td>Conscience</td>
</tr>
<tr>
<td>Choice of patients, by prestige</td>
<td>Easy</td>
<td>---</td>
</tr>
<tr>
<td>Choice of practice setting</td>
<td>High</td>
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<tr>
<td>Control of work conditions</td>
<td>Purposive</td>
<td>Long</td>
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<td>Hours</td>
<td>High</td>
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</tr>
<tr>
<td>Income</td>
<td>Present</td>
<td>Obligation</td>
</tr>
<tr>
<td>Option to do &quot;charity&quot; care</td>
<td>Present</td>
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<tr>
<td>Option to do teaching</td>
<td>Absent</td>
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<tr>
<td>Pressure toward overtreatment</td>
<td>---</td>
<td>Present</td>
</tr>
<tr>
<td>Pressure toward undertreatment</td>
<td>Absent</td>
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</tr>
<tr>
<td>Pressure to stretch competence</td>
<td>Voluntary</td>
<td>Minimal</td>
</tr>
<tr>
<td>Opportunities to &quot;keep up&quot;</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Risk of malpractice suits</td>
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Abstract

Dissatisfaction amongst the young is an age-old problem, of which each generation has had its own version. The highly visible dissatisfaction amongst the youth of the sixties, as variously manifested by the emergence of the hippies, student activists, and equal rights groups, has become a much greater social problem than with any previous generation. It is proposed, in this study, that the phenomenon of youthful unrest may be partially related to the impact of certain post-World War II influences on the conditions of affluence and poverty.

A theoretical model, designated the Affluence and Poverty (A and P) Model, derived from a general systems conceptualization of society, is developed to ground the author's field observations in a meaningful scheme. Substantive data for this model were collected over a four year period, in several cities and on several campuses. The model delineates the relationship of World War II deprivation and technological innovation to the conditions of affluence and poverty, and to socialization styles and problems of role assumption.

(end of Abstract)
That young people struggle for independence and hope to establish a world more to their own liking is an undisputable fact. In his book entitled The Challenge of Youth, Erik Erikson (1963:xv) said the following:

Alienation is part of the human condition, even if each age is rightly preoccupied with its own version. I would think that an age is not characterized by a greater or lesser degree of alienation, but by its own kind of tension.

The dissatisfied youth of the sixties have a distinct version of alienation all their own, as variously manifested by the emergence of the hippies, student activists, and racial equality groups. In order to explain this particular version of youthful unrest, it is proposed that the explanation might be found by examining a series of historical events and their consequences. In order to do this, a model, derived from a general systems conceptualization of society, will be developed. This model is used to schematize the impact of World War II deprivation and the post-war technological boom on role assumption. A chain of causality is proposed linking technological innovation and the increasing complexity of society to the conditions of affluence and poverty, socialization, role assumption and youthful unrest. Furthermore, it is proposed that this chain of causality crosscuts socioeconomic boundaries.

It should be noted that the problem of youthful unrest is a complex and multi-faceted problem. It would be audacious to assume that the following explanatory scheme inclusively deals with the problem; rather, it is put forth as an attempt to ground the author's observations in a meaningful theoretical scheme.

Sample, Data, and Method

Data for the following theoretical formulation were gathered over approximately a four year period, beginning with the Berkeley "Free Speech Movement" in December of 1964, continuing during the "Equal Rights" marches in
1966, the Haight-Ashbury and East Village "Summer of Love" in 1967, and concluding with the "Student Protests" of 1968-69. During this period of time, the author talked with approximately several hundred dissatisfied youths. Ranging in age from thirteen to thirty, they were of heterogeneous backgrounds, from all parts of the United States, from most socioeconomic backgrounds, and from a wide range of racial and ethnic groups.

It is not possible to determine the representativeness of this sample; however, an attempt was made to interview not only the most central, and often most vociferous, figures in a particular group, but also the quiet, peripheral individuals. Females were more reticent about being interviewed; hence the following theoretical speculations may be more applicable to the young American male. The sample was composed, phenotypically, of psychedelically garbed, hirsute "flower children," militant "Afro" Negroes, "mustachioed" student activists, and reasonably clean-cut collegiate types.

From the beginning, the goal of this study was to answer the question: what set of circumstances has brought about these various forms of protest amongst the youth? The method used to collect information for this study was that of a semi-structured interview. It was initially thought that a questionnaire might be developed to answer this question, but in trying out a set of pilot questions on the target population, it quickly became apparent that the dissatisfied youth had little enthusiasm for questionnaire answering. The information elicited by this interview approach was essentially life history and associational data concerning the individual, his family, kin and friends. Specific variables about which information was sought, were the following: age, education, occupation, source of income, material wealth, and immediate and long range goals. The actual method of data collection somewhat resembled the anthropological field efforts of researchers such as Malinowski (1922) and Mead (1949). Encountered were the many problems of a field study amongst a group of suspicious natives. To some respondents, an inquisitive outsider was no less suspect than a member of the local police force. The information sought was usually obtained in several conversations. Specific problems of rapport and language
usage had to be met. It was necessary, in some cases, to use a contact or intermediary to bridge the gap. Respondents varied, as would be expected, in the degree to which they were willing to reveal facts about themselves, their families and associates. The information was recorded in the form of notes taken during the conversation or at some later time, depending upon the apparent suspiciousness or defensiveness of the respondent.

Although the respondents varied in appearance, articulateness, behavior, socioeconomic level, and professed ideology, they all expressed dissatisfaction with some aspect of their existence and the adult world. However, it is not their dissatisfaction, but the origins of it which are of interest here. When the notes on life histories were compared, a pattern linking certain events in the past with the present became apparent.

One last comment should be made concerning the approach of this study. As the study developed, it became apparent that the orientation was not in the strictest sense either psychological or sociological, but was, in fact, socioanthropological. The stated aim of determining what factors have precipitated youthful unrest and the method of data collection bear a striking resemblance to studies by anthropologists of the process of acculturation, the effect of the impact of one culture upon another (Winick, 1956:3). Quoting Bengt Danielsson (1956:17) on studies of acculturation:

... we are hardly ever able to observe the changes themselves with our own eyes, but only the results or end products. Whereupon we try by means of historical research to clarify the processes that have preceded them.

Danielsson (1956) schematized the processes of acculturation on the Pacific island of Raroia, in French Oceania, by tracing the impact of European culture in terms of primary and secondary effects, as shown in Figure 1.
This study of acculturation, by Danielsson, is very similar to the present study, for the processes which have brought about the phenomenon of youthful unrest are beyond direct observation; hence the processes are inferred and historically reconstructed. A scheme similar to Figure 1 will be presented in the next section to depict these processes.

**Historical Reconstruction**

A certain alienation, as Erikson suggests, has been characteristic of young people; however, dissatisfaction has never before been so characteristic of the younger generation.

Barely more than a decade ago, the young people—particularly college students—were referred to as the "quiet generation." Many of the students who filled the colleges and universities following World War II were veterans, brought up during the Depression, whose approach to education was basically pragmatic (Brown, 1967). Brown (1967:95) has commented, "Faith in an ordered and continued use of intelligence and sustained effort within the social mechanism was the lesson which they brought out of their experience." Following this group of above average age college students were the children of a society newly affluent, the college group just preceding today's youth. A study of values in these college students (Jacob, 1960) describes what was, essentially, apathy—students unconcerned about issues, interested in material well-being, and other-oriented. By contrast, commenting on today's students Clark Kerr (Colorado Alumnus, 1969:5) former president of the University of California at Berkeley, is quoted as having said:

Changes among students themselves stem directly from the affluent, permissive and volatile society—and homes—of their youth . . . .

... many of the activists especially have come from permissive homes; the rules the student encounters on campus "are a shock".
In the present study, an appropriate point at which to begin a historical reconstruction would be at the point when this yet-to-be dissatisfied generation was born. Nearly all of this group was born either during the war years or immediately following the war, between 1940 and 1950. Their parents experienced a form of stress and deprivation that was unique to this era. Perhaps the lives of the young adults were most disrupted by the war. All people experienced economic deprivation, for example, the rationing of meat, sugar, and gasoline, and concern for friends and kin involved in the war, and uncertainty sustained by news reports. But, for the young adults, the war meant more than all these. Educations were abruptly terminated, young families were separated; the plans, the hopes, the dreams of those emerging into their adulthood were suspended. Broken engagements and hasty marriages alike were the earmarks of the interpersonal disruption. While the men fought, many women took jobs. When the war ended, the cares of the past years were replaced with an attempt to capture what had been lost. There was much time to be made up for.

Following in the wake of World War II there was both a technological and economic boom (Samuelson, 1967). The technological innovations brought about by the war effort gave these young parents more mobility, more leisure time and more purchasing power than had ever before existed. An effect of all these innovations was to reduce the traditional demands of parenthood. At the same time there were value changes, regarding authority and equality. The mother was no longer housebound by the physical requirements of housekeeping. The appliances brought by the technological boom reduced the number of hours involved in housework, and childrearing not infrequently took the form of leaving someone to watch over the offspring. Perhaps many found themselves with the responsibilities of a family before they were ready. The presence of children, because of the deprivation and disruption these parents had experienced and because of the affluence which gave them freedom, did not mean to this newly affluent group that they should "stop having fun and settle
down." Possibly because of the lingering memory of the wartime deprivation, and, for some, of the Great Depression (1929-1933), these adults felt that their children should not experience the hardships that they experienced. They found it easy to give and give-in, both materially and interpersonally. In any event, their dissatisfied children report having had most everything that they ever wanted (Time Magazine, 1967:62). Using Danielsson's previously depicted causal scheme (Figure 1) as a model, the scheme in Figure 2 is used to picture the proposed relationships between World War II deprivation, technological innovation and the manifest behaviors of today's youth. The lines of causality, which are present in Danielsson's scheme, are absent here in recognition of the complexity of the possible interrelationships.

At a conference on drug use at Stanford, Dr. John Maurer (1967:7), staff psychiatrist at the Cowell Student Health Center, made the following analysis:

In order to understand why today's young people seem so different from 10 or 20 years ago, perhaps a historical perspective may help.

Let's take a look at the much maligned over-30-year old. He spent his youth in the depression. The aim and ambition then was just to survive--and the ethic of work, career and job was the major preoccupation of all . . . .

The '40s brought the second world war, and there was no question in any of our minds that God was on our side . . . .

The boys came home and married and began to father this new generation that is upon us now. We all wanted to forget the horrors of war and along came television to help us.
We began to drink more and we began to take pills. Aspirin and Alka Seltzer and Tums and Compoz—and it helped. We faced the day better and relaxed at night better and we forgot the war. The television blared out its message about self-medication and we listened and took the pills.

Our kids listened, too, and heard that medicine and drugs make you young and sexy and relaxed and worry free. The medical profession augmented this with their miracle drugs and a major part of medicine became pill dispensation.

Let's look now at those kids. They were born in a boom-affluence and no war. They never worried about the next dollar . . . .

They didn't learn that lesson about war either—that God is on our side and that the other guys are evil and actively trying to take over the world.

They went to school, too—a new and more permissive type of school that says: The function of education is to learn to think critically—to question and ask for proof. So they think and look and see poverty and discrimination and war and misery. They feel that loss of individuality brought on by automation and the computer age.

They look with a fresh perspective and sensitivity of youth. And they are learning their lessons well. They criticize and look for new ways . . . .

First came the beatniks. They looked at the world and the competition and said "forget it. I can't handle it so I'll quit . . . ."

Suddenly there appeared a new way to establish an identity, and it grew with the civil rights movement. It came back after the summer to college and got translated into the Free Speech movement and glommed onto the Vietnam war. So an alternative developed—the New Left and activism.
Dr. Maurer went on to conclude that drug use is the logical outcome for today's youth. Although he mentioned the problem of identity, he did not examine the question of why today's youth is confronted by identity problems. The problem of identity, it is proposed here, is common to young people coming from both affluence and poverty conditions.

Up to this point, only one aspect of the problem has been examined. The proposed effects of World War II and technological innovation have been traced out insofar as they influenced conditions of affluence, but not of poverty. Affluence is here defined as a condition of relative abundance, poverty as a condition of relative scarcity. Not all parents of the World War II and post-war era lived in conditions of affluence. The impact of the War and its concomitants in some ways was felt by parents whose economic resources were scarce, as it was experienced by those parents in the more affluent circumstances. The impact of technological innovation had reciprocal effects upon the two groups. What it gave to one group, it took away, in part, from the other group. One effect of technological innovation was to upgrade the entire job market and eliminate many unskilled jobs. Although more jobs were available, the skill ceiling was higher (Samuelson, 1967). This situation led to increased unemployment of unskilled workers. The poverty parents not only had a paucity of goods, but also were acutely aware of the contrast between their circumstances and the increasing affluence of others. Their children were the first generation so poorly shielded from the knowledge of their deprivation. Television particularly contributed to this growing awareness (McLuhan, 1964). The poor were no longer ghetto-ized, no longer physically and psychologically isolated. The lives of the underprivileged are reflected in the change of euphemisms (they are now "culturally disadvantaged" rather than "culturally deprived"). Now the reference point from which to measure the discrepancy between the have-s and the have-nots is more visible. The poverty-stricken youth, in contrasts with their affluent age-cohorts, do not report that their every whim was satisfied, but report that they have always felt cheated and deprived (Report of the National Advisory Commission on Civil Disorders, 1968:251-265; Office of Policy Planning and Research, 1965).
The Affluence and Poverty (A and P) Model

To schematize the foregoing historical analysis, the following model, which appears in Figure 3, has been developed.

Beginning with World War II deprivation and technological innovation, the elements of the model have been described up to the point at which the affluence and poverty sequences converge on the aspect of role assumption. It is at this point that the dissatisfaction of this "post-modern generation" (Keniston, 1968) may be analyzed.

The latter portion of the Affluence and Poverty (A and P) Model was derived from the author's previously developed general systems SRS Model (Lee, 1967). The logic behind this reciprocally interactive aspect of the model is: via the assumption of roles, the concept of self-identity evolves (Cooley, 1922; Mead, 1934) which, in turn, influences behavior and further role assumption. In a discussion of the self concept, Secord and Backman (1964:583) have stated:

The development of the self concept, particularly a person's subjective public identities, may be understood in part in terms of his assignment to a series of social roles. As he moves through the social structure, he is placed in various role categories and acquires an identity associated with each. Ultimately some of the characteristics acquired in these identities may become a part of his core self.

Adequate role assumption is not possible if role ambiguity interferes. Failure to provide meaningful (in the idiom of the youth, "relevant") roles results in a type of role ambiguity. What is expected (role expectations) and means-ends relationships are vague, if not absent. Empirical findings regarding role ambiguity appear to support the analysis presented here.
In a study of organizational stress, Kahn, et al. (1964:347) examine the effects of role ambiguity. The authors observe:

role ambiguity emerges as a prevalent condition in organizational life. Among its probable sources are the growing complexities of organization, the rapid pace of technological change in our society, and the pervasiveness of certain managerial practices that deliberately foster ambiguity.

Experienced ambiguity, regarding one's role, was found to correlate positively with tension and a sense of futility, and negatively with job satisfaction, self-confidence, and trust in others. Role ambiguity is thus found to be related to attitudes which are also those characteristic of the dissatisfied youth of today. It is apt that the setting of the above study is an industrial organization. The structure of the American industrial organization has diffused into American society which has, as a matter of necessity, adapted to its requirements.

Returning to the A and P Model, it is proposed that the aspect of role assumption is the pivotal concept in the problem of youthful dissatisfaction. Most of today's dissatisfied youth have not been cast in or have not found meaningful roles. In a lecture at the University of Colorado, Timothy Leary (1967) described the affluent youth as "oppressed":

... and a fourth new oppressed, persecuted minority just about to grow into a majority are the young! Oh, you didn't know that you were oppressed? You fat, suntanned, air-conditioned children of the affluent society. Who, you? Oppressed? With your color televisions and your ski resorts. You, oppressed? You wealthy American kids? Yes!
The affluent parents, by sharing their many creature comforts with their children, keep their children from assuming roles, the performance of which would lead to stable self-identities. In a poverty environment, the situation is not one in which the parents keep their children from assuming roles, but the parents, because of their impoverished circumstances, are unable to provide the skills, resources, or opportunities to acquire skills which would allow their children to assume meaningful roles.

The manifestations of dissatisfaction arising from affluence and poverty are presented in Figure 4. The social factors, affluence and poverty, are shown to result in a general phenomenon, that of youthful unrest and dissatisfaction. This dissatisfaction manifests itself variously; illustrated here are the prototypes—hippies, student activists, and the equal rights advocates. To compare these adaptations to the stresses experienced by young people, these prototypes are ordered on a continuum representing the degree of active involvement of each form with the social environment. The correspondence is only approximate. Hippies fall near one end of the involvement continuum, equal rights advocates near the other, with student activists somewhere in between. The concomitant behavior characteristics may be designated as legal, ranging from social withdrawal to marches and sit-ins, or as illegal, ranging from drug use to open acts of violence, including rioting and looting. Nonetheless, the apparently different groups—hippies, student activists, and equal rights advocates—may be seen as manifestations of a commonly experienced dissatisfaction which have their origins in both conditions of affluence and poverty.

Thus there emerges from the impact of affluence and poverty on societal role assumption, a generation of unhappy, identity-searching, dissatisfied youths.
Summary and Conclusions

The aim of this study was to determine what set of circumstances have led to the widespread phenomenon of dissatisfaction amongst today's youth.

By informally interviewing a large cross-section of young people, engaged in the various forms of individual and group protest, a common difficulty was found: the problem of meaningful role assumption and self-identity. Using a method of historical reconstruction, it is proposed that the impact of World War II deprivation and technological innovation on the conditions of affluence and poverty has adversely influenced societal role assumption and thus has brought about the phenomenon of dissatisfied youth. The Affluence and Poverty (A and P) Model, a general systems theory conceptualization, is developed to schematize the phenomenon.

Such dissatisfaction and role-identity searching creates a gap of understanding between generations. Leslie Paul (Time Magazine, 1967:23), who coined the phrase the "angry young man," is quoted as having said: "The relations of the generations may become the central social issue of the next 50 years, as the relations between the classes have been for the past half-century."
Figure 1. Configurational Analysis of the Acculturation Process on Raroia (From Danielsson, 1956).
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Figure 2. Configurational Analysis (Derived from Danielsson, 1956) of the Process Leading to Youthful Unrest
Figure 3. Affluence and Poverty (A & P) Model.
Figure 4. Tri-level Schematization of Youthful Unrest Phenomenon.
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Advance reaction to the title of this paper suggested that the compound noun, "student aggression" might be an ambiguous stimulus. The term could be taken to imply that students are "aggressive." Worse, it could conceivably be inferred that students are the aggressors, that whatever evil happens is the students' fault and only the students' fault.

In order to avoid the reciprocal dangers of implication and inference, it might be well here to specify the intended definition of "aggression." In Webster's Third New International Dictionary (Unabridged), it is the definition of aggression, noun 3, to which this paper makes reference: "a form of psychobiologic energy, either innate or arising in response to or intensified by frustration, which may be manifested by (1) overt destruction, fighting, infliction of pain, sexual attack or forcible seizure, (2) covert hostile attitude, covetousness, or greed, (3) introjection into one's self (as self-hate or masochism), (4) sublimation into play or sports, or (5) healthy self-assertiveness or a drive to accomplishment or to mastery especially of skills."

From this definition, it may be evident why "aggression" was the term selected for discussion, for it is indeed the abundant psychobiologic energy of the student and the direction in which it is focused or the routes along which it is channeled that is of surpassing interest to so many, including the students themselves. Circumventing the scholarly question of whether aggression is an innate or an acquired characteristic, it is probably universally accepted that frustration, as a minimal condition, at least accentuates or increases aggression; this principle may become useful if a constructive course for aggression is laid open.

For the adult who has not sealed his own adolescence in an impenetrable vault, the nature of the frustration and the intensity of the experience will require little review here.
It should not be difficult to recall the enthusiasm, optimism, and determination with which many students leave secondary school. More difficult to remember, possibly because it is more painful to do so, is the dissolution of dreams, compromises and other adjustments of purpose accompanying the rites of passage through college, graduate school, or on into the Establishment. If one realizes this, it will not be surprising that many members of the student generation have decided to throw it all up and become anarchists.

The aforementioned unabridged dictionary defines anarchism, n, 1, as: "a political theory opposed to all forms of government and governmental restraint and advocating voluntary cooperation and free association of individuals and groups in order to satisfy their needs." If it is indeed this kind of open system that some students intend to develop, in order to avoid the bureaucratic chaos which even the best intended anarchism can produce, it will be necessary for these students to undertake some kind of long- and short-range planning--even to the point of introducing program budgeting. Unfortunately (from the point of view of adult logic) it is not likely that many young people will be convinced by the preceding arguments. If adults say: "You must make plans," and, even more subtly: "You must learn to make plans," they are likely to make the young wary of a plot to brainwash them and lead them, entranced and mindless, back into the Establishment.

How is one to convey the message that general systems thinking, and especially the concept of the open system, is intended not to subjugate man, but to promote a relationship between man and man, and between man and nonhuman environment, that will approach a system whose principal product will be human dignity and satisfaction? The answer to this is not easy to find or, when found, to formulate.

Part of the communication problem is the wariness of youth; they fear treachery. Another part of the problem is that youth--especially that segment of it which is most aware and most creative--has, to an unmeasured by probably considerable degree, rejected reason and both philosophic and scientific analysis, which we partisan but hopefully not parochial thinkers consider to be represented in its highest form in general systems thinking.
Certain truths which are self-evident to us are not at all self-evident to the student generation (or generations, for it is probably an error to assume homogeneity among students, though for simplicity the assumption is tacitly made). We believe, both for example and specifically, the following:

1. Systems thinking is not responsible for the present state of the nation either in its foreign or domestic policy.

2. The most apparent spectacular successes of systems thinking appear in our space and weapons programs, but these successes are primarily engineering and closed system accomplishments.

3. It is easier to analyze a closed system than an open one.

4. It is easier to design a new system than to analyze an existing non-system.

5. The most significant problems facing man today are of the open rather than of the closed system variety.

6. General systems people are more interested in significant, in vivo, open systems than they are in arbitrary, in vitro, closed systems.

7. General systems people believe that the same kind of logical analysis which is applicable to closed systems problems is applicable to open systems problems, although successes may not necessarily be achieved by simple analogizing or extrapolation.

8. If logic, intellect and systems analysis have been applied to problems directed toward human destruction or debasement, the appropriate response is not to become illogical, anti-intellectual, or anti-systems, but rather to question the goals and motives of the analysis or of the analysts.
9. Application of general systems research to significant human problems can result in amelioration of those problems.

10. The alternatives to a planful general systems approach are a planful authoritarian approach or a planless chaos.

While adult general systems thinkers may disagree among themselves as to the precise wording or even the specific content of each of the ten preceding points, in general there should be found agreement on the principle that general systems thinking is of value, even to anarchists. Is there, then, some obstacle to presenting to students the gift of general systems? The answer, in brief, is: no.

Two routes lie open. The first of these is through the curriculum and the second is through extracurricular activities or action groups. While traditional course and departmental structures are breaking down and the way is open for new educational approaches, it is likely that the greater quantity of student energy, as ever, is more available outside the classrooms, libraries, or study halls than in them. Therefore, while formal general systems courses, or courses strongly influenced by general systems, will inevitably find their way into formal education, it is likely that the major influence will be through extracurricular action groups. How is this influence to be effected?

But first, a warning from interested students: To appear on campus with a proposal to establish a student SGSR will probably result in setting up a group headed by what has been called "the wrong people". By this, one might infer, is implied a group of students who would like something to head, a mere credit to list among their extracurricular activities, a springboard into the Establishment. The right group, it has been suggested, are problem-oriented individuals, concerned, for example, with such matters of public policy as the efficient delivery of health services, or the development of relevant curricula. The presence of informed adults who are willing to concern themselves with
issues like legalization of marijuana, relatively unimportant though this may seem in the presence of greater threats to civilization, will go far toward answering a hopeful future for logic, reason, and constructive analytical thinking among socially conscious though apparently rebellious youth.

It is an obvious fact that youth can be compliant for healthy and for unhealthy reasons, and rebellious for unhealthy and for healthy reasons. As an interest group we are not neutral, and make the value-judgment that to seek rational solutions to problems is desirable. Accordingly, to be compliant to reason would be considered healthy, and to be rebellious toward irrationality would be considered ultimately healthy—though conceivably apparently disadvantageous in the short run.

It would seem reasonable, thus, to look toward the rebellious students, for they would seem to be displaying the greater amount of free energy. To work with them, in the areas of their concerns, developing alternative solutions to their problems—and ours as they see them—and setting up procedures to test these alternative solutions, might re-establish their faith in reason and analytic thinking, or initiate a faith where none exists.

While the preceding may seem reasonable and even desirable, there may be some skepticism as to the mode of its accomplishment. Once underway, it will carry along, because it will work. But how to begin? One might start by drawing an analogy between antirationalism and drug or alcohol addition. To treat the chemical excesses it has been found that indigenous workers are most desirable—that is, former drug or alcohol addicts. Such workers can communicate well with the target group and are trusted by them. To pursue the analogy, then, what we need are some former anti-rational student rebels who have become converts to general systems theory and who have applied it successfully to practical problems. Such individuals could carry our message with pride and would be convincing to a group only slightly their juniors.
The next step is to find such people and, with the aid of funds from as yet unknown sources, employ them to set up problem-solving or action-oriented groups. College men could work with high school students, graduate students with undergraduates, and so on.

The zero-th step, however, is now being undertaken, that is, to discuss such a plan with one's colleagues. This can be done openly, for here is no counter-revolution, but itself a revolution of sorts, against the hopelessness that is inherent in irrationality.