# Challenges from the Future

PROCEEDINGS OF THE INTERNATIONAL FUTURE RESEARCH CONFERENCE

VOLUME I

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# EDITOR'S NOTE

THE PROCEEDINGS of the International Future Research Conference held in Kyoto Japan from April 10 1970 to April 16 1970 centered around the papers presented and the discussions conducted are compiled in four volumes

The main subjects presented and discussed during the conference were 1) Reporting of activities and exchange of information by representatives of various organizations in the world that are presently conducting future studies and research 2) Presentation of papers by participants which were classified into eight general sections from the overall theme of Challenge from the Future and discussions based on these papers and 3) Discussion on the possibility of organizing an international body to conduct futures research

Due to the limited time in which an extensive range of topics were presented thorough discussion on all of the papers were not possible However from the viewpoint of accomplishments the Conference was a tremendous success and it has marked a prominent footmark in the course of futures study and research

Inclusion of the complete proceedings of this Conference in nine volumes was originally planned but due to editorial and other considerations the following four volumes have been published

**Volume 1** Section 1 The Role of Futures and Futures Research
Section 2 Research Methodology
Special Session Perspectives on Multi Channel Society
**Volume 2** Section 3 Technological Innovations and Social Change
Section 4 Education for Future
Section 5 Environmental Changes—Time and Space—
**Volume 3** Section 6 New Values New Man
Section 7 Social Systems and Social Innovation
Section 8 World Futures
**Volume 4** Program and Proceedings of the Conference

The first three volumes include all of the papers presented at the Section Meetings during the Conference and also papers contributed by people who were not able to attend

Volume 4 includes the opening lecture by Dr Ichiro Nakayama president of the Japan Society of Futurology the program reports on activities of organizations engaged in futures research summary reports submitted by each Section discussions on the possibility of organizing an international body and a list of participants

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SECTION I

# THE ROLE OF FUTURES AND FUTURE RESEARCH

# THE ROLE OF IMAGINATION IN FUTURE RESEARCH

ROBERT JUNGK
*Writer*

Since we met in Oslo in September 1967 a great number of welcome doubts have been expressed about future research Among them are two objections which are quite contradictory Some critics complain that forecasters use too much imagination and therefore cannot be trusted Others criticize that they use not enough imagination and tend therefore to be conservative and dull I happen to know some superior minds who want to be on the safe side by pro nouncing the accused to be guilty on both accounts I feel that those who judge that most of our current studies are too cautious and do not produce striking enough perspectives have really a stronger case

Many future researchers in their aim to be taken seriously lack in intellectual courage Many of today s scientific anticipations and predictions are indeed as Hasan Ozbekhan has pointed out convincingly not much more than extensions of the present It has been argued that this could not be otherwise because a human mind even the most inventive one is deeply conditioned by the moods the styles and in last resort the values which are around us If this is true man will always be a prisoner of his present But how could we then explain the many departures often very radical ones from the known and accepted which abound especially in the history of the arts and the sciences It is almost impossible to explain them logically They mostly happen in jumps and seem to be the results of sudden flashes of inspiration Advanced studies of creativity a deeper under standing of the psychology and physiology of human imagination will be neces sary to throw light into these dark corners The next most important frontier of this research may be found here in man and his immense so far only partly discovered potential

Future research directed so far mainly to technological forecasting and to much lesser extent to social prognostics will be wise to pay increasing attention to the studies of these psychonauts because so much of the future in a man made world begins really in the souls and the minds of men Waiting for break throughs in that area future researchers might make use of the existing body of knowledge produced by research on creativity Especially a new branch of future studies which will probably gain more and more in importance namely human

forecasting—or as professor Bestuzhev Lada has called it—anthropological fore casting will greatly benefit from a closer association with anthropologists ethiologists psychologists and psychiatrists In an earlier paper I have distin guished three forms of imagination which might be of use in future research First *logical imagination* second *critical imagination* and third would be *creative imagination* Of these three only the first has had so far enough attention from the futurist a fact which has considerably narrowed the scope of our studies The main function of logical imagination in the field of future reseaich will be found in the anticipation of logical futures The application of critical imagination will be indispensable for the development of willed futures as Rene Dubos has called it The role of creative imagination is of greatest impor tance in the elaboration of invented futures

The central idea of logic is the concept of order Logical imagination will try to develop concepts which will be built in an orderly way stone put on stone step after step How we know that history certainly is not made in such an orderly way We can discern a number of patterns more often after the events than beforehand In reality the role of surprise is enormous And we have only to read so called surprise free projections like the ones developed by Kahn and Wiener to see how different reality really is If logical imagination is used only as a part of the forecasting effort as a challenge as a warning or a springboard then it can certainly be of good use But much too often it is used all alone and then the logical future built that way seems to be strangely similar to the conditions we know already Only the dimensions might be changed a bit It will be the same only more so as Ozbekhan has said

But there are heuristic qualities in logical imagination which seem to me of some promise in future research One of them would be the *method of exagger ation* By logical extrapolation of an existing trend beyond the limits of the probable we will get results which are caricutures of some present phenomenon Imagine the yearly rise of GNP in the U S or any other industrial power for instance Japan to continue for another 50 or 100 years and you will come to the conclusion that the production of the year 2070 would weigh more than the entire planet Extrapolate the curve of scientific papers or the number of scien tists or the number of private motor cars and you will sonoer or later get logical but absurd results Fremlin has used the procedure in an impressive way when he demonstrated the consequences of the unchecked population explosion by calculating how soon men would have to exist like sardines The method of exaggeration may actually serve to discover some hidden or overlooked possibil ities some hidden or overlooked flaws in our present development This will be especially true when applied to whole systems In fact this has been tried in the Cacotopias of Huxley Samyatin and Orwell

Another interesting use of logical imagination as an instrument of mental experimentation might be the *method of willfully changing the parameters* It might give us new insight for instance into demographic developments if we would assume changes in the speed of population increase changes in the geographical pattern of population increase changes in the expected distribution of males and females radical control of the population increases planned and enforced population decreases

Let me dwell here for a moment on this word on that idea of mental experi



mentation because I feel that it might help to overcome the lack of imagination some critics of future research talk about Though it is important and legitimate that the vast amount of prognostic work should be devoted to clearly defined objects projects and plans it would be wrong to exclude a certain amount of less goal directed more free wheeling speculation Some years ago I tried to introduce the idea of pure social imagination in contrast to applied social imagination Mental experiments obviously belong in the first place to the realm of pure of basic social imagination Though they may be of practical use once they have been performed the original aim is simply the opening of new horizons the discovery of new possibilities the relaxation of constraints in order to find ways around them

Thus for instance the *method of paradoxes* might generate fruitful ideas by standing on their heads one or the other of the basic assumptions used by the application of logical imagination What would happen for instance if technology was not geared to produce more and more at higher speed but less and less at deliberately lower speeds? The motive might be for instance that there should be again more jobs in order to cope with the increase of the working population What would be the consequence of teenagers becoming teachers if only for few hours every week and the elder part of the population learning from them?

Among the most frequent applications of logical imagination to future research we find nowadays the *method of contextual mapping* Here again an experi mental use might yield interesting insights especially by playing with the *method of invasion by other disciplines* first mentioned and probably also discovered by Donald Schon It has so far to my knowledge mainly been used by the mutual invasion of disciplines which have one or more frontiers in common for instance physics and biology but there might be interesting cross fertilization combining and coupling more distant fields trying to apply for instance some concept used in the legal world to electronics and vice versa Quite interesting new hierarchies could be discovered that way Or we might apply for instance the composition techniques of modern music to the construction of numerically controlled machines Could this for instance influence the rhythm of production? Might it suggest perhaps a less rigid pattern of mass output?

These are a few samples of an experimental use of logical imagination Let me finish with the last sample a method which I have named *the method of the ladder staircase* called so because it might provide us with a tool to climb over the walls of the prison of time There exist hundreds of forecasts already in future research My idea would be to use one or the other of these forecasts imagine that it had become true put us in the situation of the society in which it had become true and then proceed mentally to do another forecast from that point on That would provide us with the second level which might then be used to do a forecast based on the forecast based on the forecast How far could that go on? How soon would we hit semantic or epistemolotical limits? Would it be possible to eliminate in that way more and more of the present? Probably not if we only stick to the logical steps Therefore the method might have to use the possibility of creative imagination which I will discuss later on

Now I turn to the second kind of imagination which I call critical imagina tion This will bring us back to the earth and to somewhat firmer grounds because critical imagination is not so much concerned with mental experimenta

tion nor with speculation but most of all with the problem of needed change The fact that it has been so far little used by the futurist may have to do with the historic origins and economic foundations of future research The fact that military establishments and industrial managements have been at the origin of many future studies that they were their most forceful backers and promoters has certainly made a mark Therefore much of the motivation for looking into the future has grown from fear from fear of the future fear to fall behind in the development of weapons fear to lose out in the competitive struggle for new products and new markets fear of any future which might seriously put in question the existing economic and political conditions That seems to be true for the power structures in the West as well as in the East They use the new developed methods and techniques of anticipation forecasting and planning to a large extent for crisis management and for the preservation of their own power Now that in itself could still be construed to be a legitimate aim if there would at least be attempts to analyze the coming crises in depth and without any respect for those who bear a heavy part of responsibility for them

This would mean that the future study of the world food situation for instance would no longer—as it has been done up to now—leave out the decisive role of commodity markets and the speculation in wheat rice or other futures It would not refrain from devoting a major part of analysis of the urban crisis to the present and anticipated conditions of private ownership and real estate or—to talk about the other side—about union practices in the building trades which restrain the possibility to build fast and well It would in prognoses about the further development of the socialist countries not hesitate to put the finger on bureaucratic rigidities Or to change over to questions which seem to be not political though in fact they are criticize the priority of technological values over human concerns in discussing the quality of life

How little critical imagination is used even by such an interesting and basically open minded future researcher as Olaf Helmer can be seen in most of his Delphi studies Though he has come to acknowledge the impact of social factors on technological developments he went at least to my knowledge never so far as to doubt the permanence of a profit oriented U S society Witness to such lack of critical approach is the questionnaire handed out to the participants of the First Annual Technology and Management Conference held in May 1967 at the Lake Placid Club in New York State The following eight questions were put to the participants in that particular Delphi exercise First In your opinion in what year will the medium family income in 1960 dollars reach twice its present amount? Second In what year will the percentage of electric motors among all automobiles in use reach 50%? Third In what year will the percentage of households reach 50% that are equipped with computer consoles tied to a central computer and data bank? Fourth By what year will the capita amount of personal cash transaction be reduced to 1/10 of what it is now? Fifth In what year will power generated by thermonuclear fushion become commercially competitive beside to electric power? Sixth By what year will it be possible by commercial carriers to go from New York Times Square to San Francisco Union Square in half the time that it is now required to make a trip? Seventh In what year will man for the first time travel to the moon stay for at least a month and return to earth?



This questionnaire reveals that the uncritical directors of that particular Delphi exercise believe in the future of family incomes The question a critical forecaster would ask for instance but can we really assume that there will still be families as we know them in the time frame of 30 to 60 years assumed by the interviewers They assume also (as question 2 shows) that there will be individual transportation in the future but who then is going to build all the roads to cope with it? They also want U S to accept their notion that there will be central data banks But will this be not disputed and rightly disputed as a possible step toward totalitarianism? Question Four takes it for granted that financial transactions by individuals are here to stay Critical question But is it so certain that individuals in the year 2000 will still have such critical decisions in their hands? Helmer and Gordon assumed in this questionnaire the prime importance of commercial competition even in the fields of overriding social importance This is revealed in their question about thermonuclear power But it might be safer to assume that environmental or esthetic factors will carry much greather weight in the future than they do now so that the question about the commercial competitivity they ask us will be no longer so important as it is now In question 6 they assume the prime importance of traveling at fast speed But will that still be consistent with the greater awareness of health damage caused by super sonic speeds? In number 7 they assume the desirability of going to the moon Well here actually the criticism has by now become widespread and I just have to repeat what many people say But will such a goal still be accepted as one of high priority?

It seems to be quite typical that this Delphi study was mainly concerned in what year certain breakthroughs might become realities and much less with their desirability or acceptability These futurists did not question the values the economic structures the technological goals which were more or less generally accepted in the U S of 1967 At present in the spring 1970 that is not even 3 years later—similar questions could and would probably not even be asked by the same researchers because a number of events such as the student revolts the failures in Vietnam the growing concern with the environment have deeply shattered the common place goals of 1967

I feel that the same lack of critical imagination assuming not even in a speculative manner a change in social and political attitudes marr the efforts of most think tanks in the United States or the studies of such eminent futurists as Herman Kahn and James Forester or even Erich Jantsch They see a great many changes ahead but they apparently cannot even hypothetically envisage a radical transformation or a revolution in their own countries

We find a similar if not even greater lack of self criticism in the Socialist countries Not a single prognosis from these sources to my knowledge dares ever to envisage any deep political or economic changes As for instance the later development of an opposition or of several parties instead of one monopolistic party or other future transformations taking into account the unavoidable dialectical and dynamic development of their societies The lesson to be drawn from all this is clear Critical imagination will or cannot be developed by those who are too closely tied to their establishments Its development and application will have to be carried forward by critical minorities within the system or by outside competitors of that system

What will critical imagination do and how will it proceed? First futurists will be on a permanent search for the weaknesses contradictions and inherent dangers of the existing state of affairs That will imply the study of mistakes as well as of neglects including those which would not be detected by an examination of things as they are now but likely to be found out only if you add to it the magnifying glass that is the anticipation of further development applied to the present state of affairs The lack of development of new mass transportation systems in many highly industrial countries the lack of planning concerning the future participation of a growing intelligentsia in the direction of the state and the industrial enterprises the impact of a value change in the upcoming generation might be classified as such critical future studies which would have to be done

Another critical instrument and I think an indispensable instrument in the evaluation in the future research will have to be developed from some rather impertinent questions Questions like First Who did the study? What is his mental make up? What are his social conditions? Second Who financed the study? Third Whose interest were best served by the study? I feel that we cannot do away with the investigation of such relevant basic questions

But such diagnoses are only the first step in the working of critical imagination The second step will be concerned with the invention of better futures based on the critical evaluation of presently visible or anticipated developments Such detailed models for instance of more human and more democratic institutions and conditions have again more heuristic and experimental qualities than a concrete planning function They should make it clear to everybody already critical about his own conditions that a vastly different future might be possible and how it could not necessarily would look By such dual attack upon the present a frontal attack by exposing the existing weaknesses and an attack from an assumed better tomorrow as spelled out by desirable alternative futures the critical futurist might help to bring about that kind of deep and necessary transformation which has become the dream of those who will actually live in the future the younger generation (which I must add is unfortunately not here at this conference)

Therefore critical imagination will appeal mainly to the men and women under thirty They are and that is the serious matter still kept ignorant of a great deal of anticipatory studies which are being treated as proprietary information But they have some things at their disposal which will be even more important than such data that is a sharp judgement a high degree of independence and the visionary powers which are strongest in the first 10 or 15 years of adult life as psychological studies about eminent innovators in the natural sciences have clearly shown

Now let me turn finally to the uses and possibilities of creative imagination I value it most of all but it is the most difficult to bring about My own definition of it reads creative imagination is not content with extending combining or negating already existing trends It attempts by breaking out of the existing systems or counter system to strike out on a completely new course breaking radically with prevalent concepts Creative imagination gives birth to a new era whenever and wherever it emerges It marks an epoch and very often it locates a new state of mind beyond the controversies which were



characteristic and apparently inextricable in the times it left behind We have experienced such a breakthrough of creative imagination when the age of enlightenment slowly emerged while the deadly struggle between Catholicism and Protestantism still ravaged Europe of the 17th century That was the base for the breathtaking development of science and technology in the three hundred years to come Is it not conceivable that now another change is ahead which would relegate these religions of our days science and technology to a place of at least lessened importance?

The main obstacle to such an emergence of creative imagination is in my opinion our out moded concept of so called facts or data Only data that can be defined checked and proved are held to be valid by present scientific standards This approach is considered to be realistic though in fact it negates the dynamic and ambivalent character of reality New concepts of what data are should recognize that they are merely still pictures in a moving scene that the reality is fluid and subject to constant change Future research which is exclusively working with data of the old style will always base its anticipations on something which is already dead which is surpassed and long since replaced by other data which in the same moment we can observe catch and define them have already ceased to be in the running Instead of the data of the old kind we will more and more have to consider processes and data in being meta data as I have called them

Creative imagination will not be afraid of visions coming suddenly into the view from the forces of the unconscious It will patiently hold itself open for hunches for day dreams for sudden sparks of insight It might rehabilitate even mystic enlightenment as a source of new insight I feel that we have very soon to develop *mind laboratories* which will methodically find out how creative imagination might be produced by conscious efforts rather than by accident or patient waiting I feel that the country which holds this conference would have to contribute very much especially to that last and highest form of imagination Future research must take into account the developmental faculties of man himself which have been neglected by the exaggerated importance he gave to his technical tools In Kyoto in a town famous for its ancient places of meditation a conference on future research might just have found the right starting point for the rediscovery of the voyage into the interior of man Because the future of man will certainly lie in man himself in his faculty to relate himself to something vaster as well as deeper than material power Thank you

# PROBLEMS IN SOCIAL AND CULTURAL FORECASTING

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The central problem in relation to social and cultural forecasting is that our prediction record has been rather weak Even in recent years we have been unable to predict with any reasonable degree of accuracy many of the crises which now trouble not only our local societies—but also the larger world community

This critical comment need not be confined to social and cultural forecasting only It applies also in varying measure to the seemingly more rigorous areas of economic technological political and military forecasting

Our concern here however is with the specifically social and cultural aspects of futures prediction

We may note initially that most serious attempts to forecast major changes in these areas tend to be phased in terms of the consequences or implications of other *determinant* events Social and cultural change is tacitly assumed to be dependent upon scientific technological economic political change agencies These agents on the other hand are regarded as less influenced by and causally dependent upon socio cultural change

For example

(i) the social forms of *work in the future* are usually viewed as directly contingent upon the development of specific technologies or new scientific developments

(ii) the possibilities of increased *leisure* are approached in problem terms—with solutions to be sought through the use of various technologically generated work surrogates

(iii) the *arts in the future* are usually so naively considered as to be a marginal component in most social forecasting

(iv) the consideration of new *styles of life* as reflecting changes in institutional forms and individual relations to society tends to be oriented towards the breakdown of past and present norms and values

In general the forecasting of social and cultural changes is focussed more upon the problems which man and his society are likely to encounter in the near and distant future than on widening human possibilities This area of forecasting is on the whole negatively oriented towards the dystopian viewpoint—as scientific

and technological forecasting tends towards the utopian

One finds this expressed most strongly in preoccupations with the increase in complexity of life in the technological society in emphases upon the trends towards uniformity of social and cultural experience the persistence of conflict and recurrent crises the decline in privacy the breakdown in values and tradi tions etc

Of course these *are* critical and problematic aspects of social life in the pres ent which are likely to continue into the future Human society *is* undergoing a severe and traumatic series of accelerating change processes which have ex tremely problematic and negative connotations for its future survival We *do* need even more urgent attention to the many major problems affecting our society in the present and threatening aspects of its future

But there is little attempt made other than in such problem oriented terms to detail out which *specific* social and cultural changes might take place or what the *content* of various kinds of social and cultural experience may be in different futures ranges and conditions

As earlier noted change factors are assumed to arise in other more instrumen tal areas of human activity i e technology the economy the polity etc —and they then affect social and cultural life The reverse process in which changes in social and cultural processes may directly influence change in other sectors is rarely considered as an alternative deterministic sequence

There are several conditions in the development and organisation of futures research which may account specifically for our relative weaknesses in social and cultural forecasting

*One* is that our present range of monitoring and forecasting agencies tends to be concentrated in and aligned towards other aspects of society Broadly speak ing much of our forecasting work e g scientific technological economic and political is carried out for a specific client agency or institution It tends to be committed to particular sectors of society in terms of its support and this in turn often limits the purview of its forecasts within some specified context and range

*Two* the disciplines involved in such forecasting activity also reflect its internal requirements There are relatively more physical scientists mathema ticians economists and political scientists involved in these areas—than histo rians psychologists anthropologists sociologists etc The least representation is from the arts and other areas of cultural activity

This developmental imbalance may be explicable in terms of the more recent and *pragmatic* basis for forecasting and futures research

We have become accustomed to the idea that science and technology function as the main agencies of innovation in our society—and have felt until quite recently that the individual and society could only *adjust* to such changes and their attendant economic political and military realities

The pace has been set by the *hard sciences*—the softer social sciences the arts and humanities could only express reaction to such changes as occurred Their function was reserved at best for *communicative reflective* and *adjustment* roles

The softer disciplines provided the trimmings to adorn living and make it more meaningful The social sciences could record social processes measure



cultural interactions but their predictive and evaluative relation to social change has been somewhat eroded by the value free orientation brought over from the physical science *e g*

> While discussion of social change has become increasingly fashionable for social scientists to discuss the measurement of social progress is distinctly awkward for sociologists for we have been firmly schooled in the conviction that progress is not a scientific concept That is the argument goes scien tists may observe and perhaps even predict change but that they have no special qualifications for *evaluating* change by way of approving or disap proving its direction *

Our only large scale social forecasting and planning has been carried out through the political process This has operated largely in an after the fact manner and then mainly to adjust to changes already ongoing and visibly apparent Rather than forecasting and planning the established political process is increasingly preoccupied with crisis management

In order to deal more systematically with the internal weaknesses in social and cultural forecasting it may be useful to discuss those specific areas in which some inadequacy may be defined

These may be best discussed in the order in which they might occur in a predictive model

(i) Premises (iv) Methodology
(ii) Models (v) Forecasts
(iii) Data

One works from a set of given premises to generate hypotheses and models of the future Data is assembled and manipulated in some methodical manner to generate predictions forecasts scenarios etc

## PREMISES/MODELS

Most of the premises upon which we base our social cultural political and economic conceptions of man his institutions and relationships to society were defined in pre industrial times The bulk of our traditional socio political eco nomic and even Aesthetic theory still draws its theoretical mainsprings from sources in the 18th and 19th centuries—at a time when Western society was entering into the first critical period of transition from our agriculturally based marginal survival type of society to one predicated on new types of potential machine abundance

Borne of the social disorders and abrupt changes attending the demise of an old form of society the grand social system theories of Comte Spencer Marx reflect an underlying pessimism and troubled uncertainty about the future condition of man The next generation of influential thinkers in the social sciences—Durkheim Freud Weber Pareto etc —reflected and perpetuated these anxieties in their basic theoretical assumptions *e g* Weber s key phrase

*Eleanor B Sheldon and Wilbert E Moore *Towards the Measurement* of Social Change Implications for Progress Russel Sage Foundation 1966

Man is freed etc but also from security and a sense of belongingness he is disenchanted disillusioned and estranged is still echoed in much of our current discussions of the future

The limitations on human experience the inevitable constraints of society upon the individual the need for collective security and the cohesion of traditional social bonds to escape various versions of alienation and anomie have become the major stated and unstated premises of much contemporary social thought

From these premises a problem oriented view of modern industrial society emerges which still persists It tends to view rapid change as disruptive—focussing on effects

(a) on traditionally socially cohesive institutions
(b) the disintegration of the family
(c) the routinisation and loss of meaning of work
(d) the psychic decay and faceless anonymity of the city
(e) the uniformity and constraints upon the individual etc

It is in effect a *value indictment* of what is termed mass society —as inevitably contingent upon large scale industrialisation

How much is myth how much reality in such premises is difficult to disentangle Though supportive of humanitarian concern and ameliorative social legislation the mythical aspects of this image of society may well hinder more radically innovative directions—and certainly constrains the types of social and cultural prediction which are possible

What might we identify as some of the more questionable and mythical aspects of these premises? In general they are those components—attitudes values and institutions—which had great social survival value in the past—but may now through their obsolescence endanger our survival in the present and cripple our approach to the future

*Change*—a key factor obviously in dealing with change is the acceptance of change Our unstated premise is still that change is unstable We change yes but *from one stable form to another*

We tend to assume that the valuable elements in human social and cultural experience are associated with past periods of (apparent) stability and permanence *A golden age myth* which though comforting is largely illusionary We did not have stability in the past but only slower rates of change

The choice is not permanence *or* change but how we might accommodate areas of permanence or continuity within change *Change is the constant*—hence rather than phrasing it as an absolute—we need to study more closely those rates of change which are controllable and which we may wish to control

## DATA

We cannot simply put down the data or substantive indicators of social and cultural change because in many cases our problem is a conceptual one We have in many cases abundant indicators which we do not recognize as such because they do not conform to our conceptual models of the interaction of technology and society Recent emergency pressured attention to the various longstanding



social consequences and policy implications of technology are evidence of such lags in conceptuality

The socio economic data and standard indicators of technological change—productivity work force distribution and expenditures—operate on a fixed model of relations between *input* (work technical devices and energies) and *output* (as goods capital and more elusive services ) This fixity is based more on classical notions than on practice As Heilbroner states We do not have anything approaching a theory of technological progress and change still less a unified technological economic model

As this area appears particularly threatening to many of the core values of our society for example work productivity and the central nature of socio economic institutions we may be rather fearful of approaching the task of remodelling our relevant theories There are a number of indicators and technological factors which seemingly elude its grasp

Our conceptual model is heavily biased on the visible agricultural type of preindustrial accounting with its emphasis on sequentially limited material exchanges of goods Those major services such as transportation communications and the knowledge industry mentioned above which now pervasively maintain our societies in a less visibly accountable fashion tend to be less clearly identified

In general then the task of devising social and cultural indicators of change which might give more adequate data for prediction involve for example

(a) Transferring our presently quantitative data and indicators into *qualitative contexts and forms*—by asking what they mean in terms of *some qualitative change in human life* in life style and in the social contents of our major institutions
(b) The use of *surrogate indicators* through which we may interpret given quantitative measures as evidencing a qualitative change in society For example measure of life expectancy may be employed and augmented to measure improved health expanded leisure larger education and increased social and psychophysical mobility Or the number of safety miles traveled on various forms of transport may indicate similar accounting of future social benefit—as a corrective to the more negative mode of emphasizing travel fatalities and congestion crises
(c) *Access to services* as income becomes detached from productivity in the economic sense such access to societal facilities may no longer be predicated directly on earnings as purchasing power of services but may be more directly linked to professional occupational role We may note that access to communications information and transportation services etc is differentially shared by those in the professions the academy government and business—and equally access to services is denied those who do not occupy various given socio cultural roles

Life services may make a separate category here as substituting for those more narrowly defined as health education and welfare and extended broadly into leisure recreation and cultural areas Life services would connote not only those necessary to the maintenance of life in physical terms but those services which are requisite for its fully participative enjoyment—for over all well being—within society

(d) *Choice and constraints* access to services implies availability and choice We do not have any compiled data indices on the degree and flexibility of choice or alternate life strategies open to individuals in our societies

Freedom is not always from something but freedom to choose various models and styles of living

A futures choice index might well be related to a constraints index which would also provide some cross indication of the limiting societal contingencies on various forms of social innovation on discrimination and the like—both in the present and for avoidance in the future

Within the design of such social accounting and prediction measures is the problem of basic conceptual model(s) already noted We need to develop models which will accommodate the various intangible and qualitative types of socio cultural prediction we now require

One possible practical base for the development of more adequate social models may be the human organism itself described in terms of its life years its life spaces physical and social cycles and psychophysical parameters of growth changing requirements and needs

## METHODOLOGY

This is linked overall with the problem of DATA Much of the data which is *admitted to* the forecasting process is determined

(i) by the methodology traditionally obtained in the field(s) of the forecasting individual or institution

(ii) tends by this reason to be what Biderman has called *administratively convenient data* e g Tabular arrays of quantifiable items which may be manipulated in accordance with various mathematical techniques

(iii) by the conceptual premises and hypothesis which are consciously subscribed to—or unconsciously assumed

**In General**

a) the methodological approach of many of our forecasting institutions tends to inhibit the monitoring and evaluation of the kinds of changes in socio cultural trends which do not come within the range of their data perspectives

b) Confronted with the problem of changing values life styles conceptual orientations etc there is a tendency to regard these as of marginal concern Quantifiable data is difficult to assemble and manipulate in these areas They are regarded as ambiguous end conditions whose *causal* determinants are in areas more susceptible to traditional measures e g economic scientific technological geographical etc

A further data/methodological weakness lies in the tendency to prefer *canonical* data sources e g official reports learned journals professional papers etc — as against *non canonical* sources such as materials emanating from other sectors of the society—mass media specialised marginal/deviant group communications underground press film etc



The analysis of public images for example and the extrapolation of their predicted trends will require changes in traditional methodological approaches The *symbolic content* here is of greater importance than is presently assumed in academic communications research Much of our look out and monitoring work is singularly lacking in its ability to deal with symbolic communication of these types—and its predictive capacity is thereby much impaired

It requires as much methodological expertise to monitor and extrapolate the diverse modes and contents of symbolic communications in society as to gauge its scientific economic and technological trending

Novels films television art comics and advertisements etc are no less difficult to interpret as sociological evidence than four fold tables or computer print out Unfortunately those most expert in the latter types of hard analysis are as correspondingly inept and unskilled when confronted with indicators of social and cultural change which are not couched in traditional data forms

## FORECASTING

When we to come to consider actual *forecasts* we may note again that they are specifically lacking in their socio cultural dimensions—through all the inadequacies dealt with above

*e g*

a) They tend to exhibit certain fixed assumptions about the centrality and role of various social institutions—the economy the military the polity—regarded as relatively unchanging in their central function

b) Socio cultural *objectives* tend to be held constant—in terms of traditional cultural experience and expectations

c) They are problem oriented—as already explored—and further the visible and established profile of interests/preoccupations of our present society tends to be carried over onto projected societal forms

d) They are in the main deterministically based—focussing on the *probabilities* and *possibilities* of given projections restricted within social models *over conditioned* by unexamined theoretical premises

Staying with the probables and possibles as restrained within our present conceptual views tends to deny the larger role of human needs and desires in forming the future

**In Conclusion** one might say that the problems in socio cultural forecasting are in effect a reflection of the problems in our current society They are also in themselves strong indicators of the low priorities assigned to the social and cultural areas of human activity

To the extent that future forecasting contributes to the forming of the future as self fulfilling prophecy we do need to consider the ways in which our social and cultural futures may become impoverished by the problem constraints we have briefly outlined

The future may be literally as we choose to view it—and the conscious degree to which we may materially control our future is quite unprecedented Our need therefore is to widen the process and objectives of social and cultural

forecasting—so as to expand rather than diminish our range of our choices and options

# DELPHI AND CROSS-IMPACT TECHNIQUES AND EFFECTIVE COMBINATION FOR SYSTEMATIC FUTURES ANALYSIS

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## FOREWORD

The research reported in this document was supported by the National Science Foundation under a contract to develop methodologies for study of the interrela tions between technology and society including aspects of technological assess ment and resource planning

An earlier version of this paper was read by the author at the International Futures Research Conference held in Kyoto Japan in April 1970

## INTRODUCTION

In but a few decades our time has been alternatively called the atomic age the space age and the age of automation Perhaps it may be more accurate to call our time simply the age of change For indeed we are experiencing many major changes in our society Progress in science and technology has produced changes which have already affected our planet markedly and progress in biogenetic engineering may soon lead to changes in man himself However these changes are also evident in our concepts of society and social order As a result the com ing decades may be called the age of improving the quality of life and the age of technological assessment

An awareness of the need for social control over aspects of change in our society is evidenced in many government programs However moving from problem awareness to effective control or corrective action requires a level of technological and sociological understanding which can promote appropriate decisions Decisions concerning society typically involve long time lags between action and reaction They also involve data and considerations which are highly subjective—subjective in the sense that they do not obey any known specifiable laws and must therefore be evaluated judgmentally

Of course any decision regardless of the type of data on which it is presumed to rest involves judgment—typically value judgments regarding effectiveness cost and risk And in spite of widespread use of systematic planning techniques

complex problems—particularly social problems—still defy meaningful analysis This leads to difficulties in anticipating prospective changes sufficiently far into the future to improve long range decisions and avoid either premature obsoles cence or unexpected difficulties

The combination of long term programs and the rapid pace of change has shaken the confidence of many decisionmakers who are too frequently con fronted with programs that are outdated before they are completed NASA s Dyna Soar and the Air Force s Manned Orbital Laboratory programs are two examples of this problem Numerous less publicized examples of this type can be found in many aspects of our society including our every day lives

On the other hand premature obsolescence may be less significant than many of the technologically caused problems we face today because accompanying our propensity for change has been a marked increase in the magnitude of changes we have produced Major changes can produce secondary effects which can be highly important in their own right Moreover when they are coupled with the secondary effects of other programs they can produce changes of still greater magnitude And since our ability to anticipate prospective developments for single programs is limited we experience even greater difficulties in effectively anticipating the interrelated consequences of many actions

Futures research is directed toward the goal of providing greater insight into prospective developments and their interactions in a dynamic society This research is not a passive or merely intellectual exercise that is it is not premised on the assumption that the future is inevitable and that the business of the fore caster is simply to describe it as it will be On the contrary futures research assumes a multiplicity of possible futures and the necessity of choosing among them For this reason such research is intimately tied to the present in that it attempts to provide today s decisionmakers not only with an improved ability to anticipate likely occurrences but to evaluate how their actions can change the outcomes

The elements of a futures analysis are very similar to those of a systems analysis and are relatively insensitive to the specific issues being addressed Generally involved are the steps outlined in Table 1 The initial step is concerned with defining the problem in as clear and concise a manner as possible understanding the dynamics of the functions involved and establishing the nature of the infor mation needed to enable the decisionmaker to act most effectively Failure to understand and organize these aspects may often be the cause of an ineffective analysis

Subsequently the analysis is concerned with forecasting the developments relevant to the issue Initially nonintervention on the part of the decisionmaker is assumed It should be emphasized that nonintervention here means no change from current behavior that is maintenance of the status quo The third step explicitly addresses the actions that reflect alternatives which the decision maker controls and the possible effects of choosing those alternatives on the outcomes that might otherwise be expected

The final step consists of the identification and assessment of the potential futures and the determination of those outcomes which are most important for the decisionmaker to address This is not to be interpreted in terms of the best or most desirable outcome but rather by a combination of probability and desir



**Table 1**

ISSUE ORIENTED INFORMATION
- -Objectives
- -Scope (relevant domain time period)
- -Factors influencing the issue (values motivations)
- -Information needs (indicators measures of effectiveness credibility)
- -Current status

PROSPECTIVE DEVELOPMENTS
- -Major events
- -Event oriented information (likelihood time period importance desirability)
- -Event interactions

POTENTIAL ACTIONS
- -Alternatives
- -Anticipated effect on events

ALTERNATIVE FUTURES
- -Potential outcomes (likelihood time period)
- -Assessment of outcomes (indicators measures of effectiveness credibility)
- -Most important alternatives and actions

ability (or undesirability) These most important outcomes including the possible actions they embody are intended to provide the framework for more rigorous operations analyses before any specific recommendations are made

The following paragraphs discuss an approach to that portion of futures anal yses concerned with anticipating likely developments and alternative actions Two experimental techniques being used for systematically assessing expert judgment in evaluating future oriented issues—the Delphi technique and cross impact analysis—are described and shown to be highly effective when used in conjunction with each other As will be seen the use of these techniques in this manner requires that the information derived from the Delphi process be in the format required for cross impact analysis

## PROSPECTIVE DEVELOPMENTS

Only if the decisionmaker understands the likely consequences of inaction can he determine the need for action on his part This requires understanding at least the major developments (or events) that may occur in the time period of interest relevant to the issues being considered *

*Developments or events as referred to here denote specific items which may occur in the future They are specific in the sense that their occurrence or non occurrence can be rigorously determined In this context scientific breakthroughs political or social actions and trends are all admissible However each must be specified so that occur rence or non occurrence can be rigorously determined on a yes or no basis This can be quite difficult when the quantitative indicator of an event can change by relatively small values For example an event can be that by some time in the future the population will be K people or more Introducing such events on a specific yes/no basis implies that a population of K has a given level of importance whereas a population of K−1 is of a different level of importance Clearly when K is very large this difference is trivial

Identification and definition of prospective developments alone is inadequate the likelihood of occurrence of these developments as a function of time also must be determined And it must at least be recognized that the likelihood of occurrence of any one event typically depends upon the occurrence or non occurrence of other future events which precede the event in question

A futures analysis attempts to evaluate the prospects reflected in combinations of potential events considering all of their possible sequences and alternative actions for the time period of interest Clearly many futures are possible And when many events are included the likelihood of a single combination in any one sequence is typically very slight Therefore a futures analysis is apt to be more concerned with identifying populations of similar outcomes and determin ing what the relative desirability of these populations is and how amenable they are to changes in the face of possible action programs

To satisfy these needs forecasts must be obtained in a manner that permits analysis not only of changes in likelihoods of individual events but also of alternative permutations and combinations Efficiency in this procedure is highly important Since an extremely large number of possibilities may be derived from an array of events including alternative actions data compaction is practi cally a necessity Consequently the nature of the forecasted data is dictated more by the informational processing technique than by the issue being studied

The Delphi and cross impact techniques can be highly effective in dealing with this problem in futures research These techniques are discussed in the following pages First cross impact analysis is described This is followed by a discussion of the nature of the information to be forecasted and a description of the Delphi technique which is recommended for obtaining this information Finally an example of a futures analysis using these techniques is presented and discussed

## CROSS-IMPACT ANALYSIS

Cross impact analysis [1] is an experimental tool that attempts to evaluate average likelihoods of occurrence for each event in a set of interrelated events considering all possible sequences and occurrences or non occurrences among the events in the set Interrelations among events refers to the increase or decrease in the likelihood of occurrence of a subsequent event produced by the occurrence or non occurrence of all predecessor events in the set

To perform a cross impact analysis a specific set of events and probabilistic data must be obtained This consists of the relevant events believed to be impor tant to the issues in the time period being investigated estimates of their initial (or individual) likelihoods of occurrence and a quantitative description of the effect of the occurrence (or non occurrence) of one event on the likelihood of occurrence of each of the others in the set

All important events which are coupled (a term explained below) which are relevant to the issue or issues being evaluated and whose outcome is uncertain (as opposed to those that almost certainly will or will not occur) should be included in the set to be analyzed Practical computational constraints often necessitate limiting the number of events that can be handled These constraints include both subjective input requirements and computer capacity



Coupling of events refers to the manner in which the occurrence or non occurrence of one event affects the likelihood of a subsequent event Three types of coupling are possible (1) totally uncoupled (2) coupled and (3) totally included Figure 1 illustrates each of these types

Events which are *totally uncoupled* are those whose occurrence or non occur rence has no effect on the likelihood of occurrence of the others in the set These should not be included in a cross impact matrix For a simple example of uncou pled events consider the issue of the future economic state of some country Event A may refer to the discovery of a mineral deposit in that country and event B to the size of the fishing harvest at some time in the future Events A and B may be regarded as uncoupled since the occurrence of A appears to have no impact on the likelihood of occurrence of B and vice versa

In actual analyses uncoupled events are of relatively little importance since the events which are both important and relevant to a particular issue are rarely totally uncoupled from *all* of the other events in the set

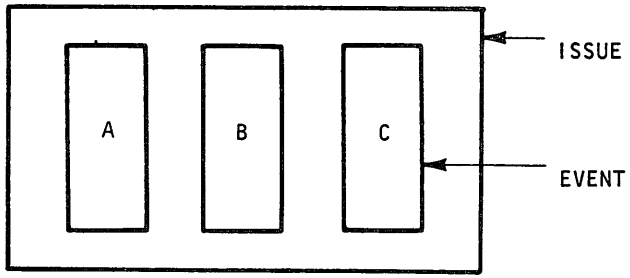
*Coupled* events also can be illustrated using the same example Consider event A to refer to the size of agricultural harvests and event B to be the develop ment of low cost electric power at some time in the future It may be argued that event B could lead to an economical source of water for irrigation through desalination and thereby strongly enhance the likelihood of an increased harvest Important coupled events should always be included in a cross impact analysis

*Totally included* events can be illustrated by expanding the previous example This expansion consists of including as an explicit event event C the develop ment of a means of obtaining low cost water for irrigation If C is the result of B the impact of event B on A may now be considered fully contained in C And while the occurrence of B may increase the likelihood of occurrence of C it would be incorrect to note both B and C as having directly enhancing impacts on A Totally included events may be included in a cross impact analysis but care must be taken to avoid estimating their impacts more than once

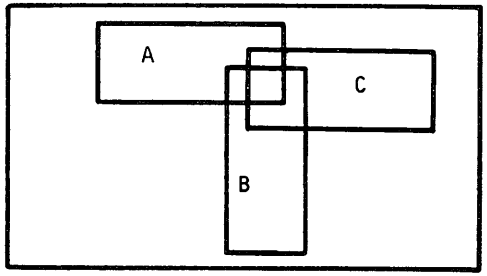
Performing a cross impact analysis of the type described in [1] requires estimates of initial or individual likelihoods of occurrence and of the cross impact factors among the events in the set In providing the initial probability estimates the forecaster considers an environment which might have normally evolved from present circumstances He then develops the cross impact factors by assessing the interrelationships among the events in terms of whether the occur rence of each event increases or decreases the likelihood of occurrence of each of the other events and if so to what degree These interrelationships are evaluated to determine the final likelihoods of occurrence of each event in the set These final probabilities represent the average likelihood of occurrence of each event considering the accumulated impacts of all of the occurrences of the other events in the set but restricted to interactions among pairs of events only *

The analysis can be performed with no preferred sequence of occurrence

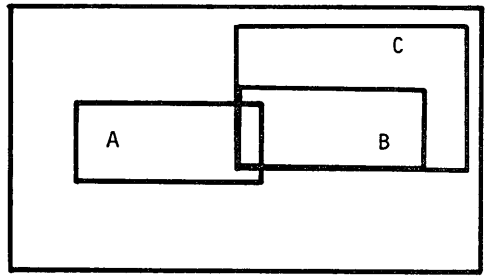
*What this means is that the effect of the prior occurrence of events 1 through N is included in evaluating the likelihood of occurrence of event N+1 but only in pairs so that the effect of the occurrence of event 1 on N+1 event 2 on N+1 and event N on N+1 are all included separately However the combined effect of events 1 and 2 on N+1 and so on is not taken into account




TOTALLY UNCOUPLED EVENTS




COUPLED EVENTS




TOTALLY INCLUDED EVENTS

Figure 1 - RELATIONSHIPS AMONG EVENTS



among the events that is in a random order ** Conditional sequences such as one in which event A must come after B or A is to be included in the set only after B and then only if B is deemed to occur (or not occur) are also permitted The final probabilities reflect the effects that a specified or random sequence and the cross impact factors have on the likelihoods of occurrence of the other events in the set

The major advantages of the cross impact technique are its ability to account for interactions among many events systematically to organize data describing a large number of possible outcomes so that a *relatively* small number of inputs are sufficient to test the sensitivity of average outcomes to changes in initial likelihoods of occurrence or in sequence or both and to provide logical retrace ability in that a change in probability (initial to final) can be reviewed and the reasons why the change occurred can be ascertained at least generally

The major weaknesses of the cross impact technique (as originally conceived) are that it does not account for the effect of non occurrence of events a situation which leads to ambiguity in defining the initial likelihoods of occurrence the definition of the cross impact factors is not specific the mathematical transform and analytic procedure have no logical justification the relative likelihood of individual sequences of events cannot be directly assessed and only the interac tions among event pairs are considered

## FORECAST REQUIREMENTS (DELPHI TECHNIQUE)

The literature on major social issues always abounds with anticipated develop ments These are typically the result of individual or group analyses or foresight and they are generally reviewed by decisionmakers in attempting to steer an appropriate course into the future However group opinion regarding likely future developments is often more important to decisions which represent or affect social actions or anticipations

The common vehicles for obtaining these opinions include conferences elec tions and polling And these are likely to continue to be the prime vehicles for obtaining such judgments However there are other techniques which systemati cally elicit judgments that appear to be capable of improving group insight into likely occurrences The Delphi technique is an attractive although still experi mental method of overcoming some of the difficulties encountered in using other methods Delphi is a program of sequential interrogations interspersed with information and opinion feedback [2] It is generally used to promote communi cation to enhance the prospects of obtaining group consensus regarding possible future developments

Effective communication is often inhibited in a conventional conference by psychological factors oratorical salesmanship an inability to assure that all points of view are heard specious arguments and perhaps most important lack of concise documented statements of what has transpired The Delphi technique attempts to maximize the focus and quality of the communication

**A random sequence is used only in the absence of information which could fix the sequence

within the group by systematically exploring—in an objective environment—factors relevant to a given issue

The Delphi process can be viewed as a series of controlled conferences As such it has two main characteristics

1 Individual contributions are requested from each participant simultaneously at each step without knowledge of the inputs being submitted by the others for that step
2 Anonymity of the inputs (and if possible also of the participants) is maintained throughout the entire conference

A Delphi conference typically sets aside areas on which the panel agrees and focuses upon areas of disagreement during subsequent rounds Because Delphi conferences are typically conducted in writing they produce concise written summaries of areas of consensus and dissensus and the arguments supporting alternative viewpoints This product is often of value long after the conference is completed However a Delphi conference often compromises the desirable features of a conventional conference such as speed ability to perform a large number of iterations and intellectual stimulation

Concern over these limitations has given rise to Delphi research in which open discussions or personal interviews take the place of written questionnaires in one or more rounds of the inquiry It is too early however to judge the value of this research to make firm recommendations regarding desirable combinations or sequences of the possible types of interrogation

While considerable research has been devoted to understanding the theory and mechanics of the Delphi technique in order to improve its accuracy [3] it appears from actual practice that the most important advantages of the technique are those that stem from the improved communication that results from anonymity It is anonymity which enables the Delphi technique to overcome many psychological barriers to communication such as a reluctance to state unpopular views to disagree with one s superiors or associates or to modify previously stated positions On the other hand anonymity sacrifices individual recognition as a motive for contributing freely to the inquiry Therefore it is highly unlikely that participants in a Delphi conference will disclose for example the results of their latest (unpublished) research It is equally unlikely that they will disclose proprietary information However the Delphi technique can be used effectively to bring together many points of view on complex issues to produce a group position that may otherwise be undetectable Anonymity provides the necessary ingredient for accomplishing this objective not just in theory but in practice *

## CASE STUDY

Cross impact and Delphi techniques were used in a case study performed in

*In application of the Delphi technique complete anonymity is almost never fully attained Generally the source of each input is known at least to the intermediary Devices to circumvent this degree of identification present many difficulties and may still fail to assure the respondents of complete anonymity In the end it is the integrity of the intermediary to maintain anonymity that the respondent relies upon and in actual Delphi inquiries this has proven effective



September 1969 for the Seminar on Public Administration at the College of Europe in Bruges Belgium [4] In this study 33 government officials from more than ten countries explored a number of events they considered important to the economic social and political environment of Europe for the 1970–80 decade

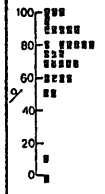
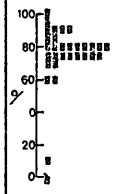
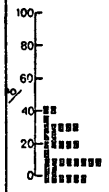
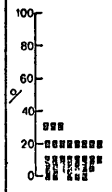
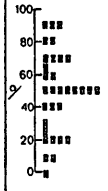
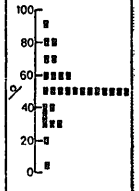
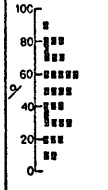
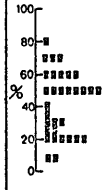
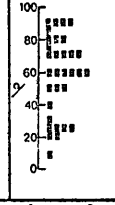
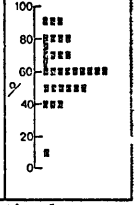
The case study was primarily a demonstration of how the systematic procedure used in futures research can enhance the insights to be obtained from informed judgment The study involved the following eight activities

1 Identification of events which were possible by 1980 and would be important to the future of Europe if they occurred
2 Selection of ten of these events for inclusion in the demonstration (this limitation was imposed solely for practical reasons dictated by the magnitude of the effort that could be undertaken in two days)
3 Estimation of the initial likelihood of occurrence of the ten selected events by 1980
4 Estimation of the cross impacts among these ten events
5 Identification of those events where society s intervention could change the likelihood of occurrence and assessment of the desirable direction of such interventions (to enhance or inhibit the occurrence)
6 Probabilistic evaluation of outcomes considering the initial likelihoods of occurrence and the cross impacts among the ten events with and without interventions by society
7 Probabilistic determination of five possible futures
8 Subjective assessments of the five possible futures in terms of a limited set of social indicators

The Delphi technique was used only to elicit numerical estimates (That is only numerical inputs were submitted anonymously and in writing ) All preliminary discussions were accomplished orally and once the spread of opinion was determined through the Delphi procedure proponents of extreme positions were asked to defend their positions openly prior to re estimating This modification of the Delphi process was introduced because of time constraints and language difficulties

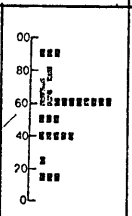
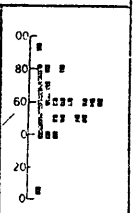
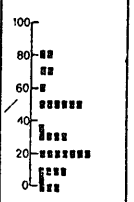
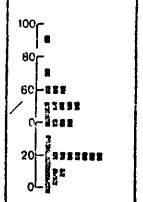
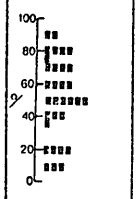
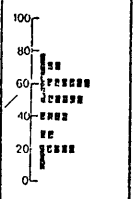
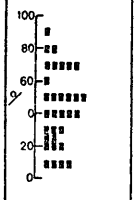
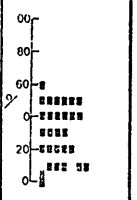
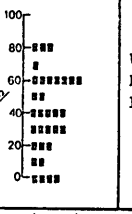
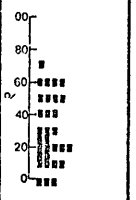
There were two rounds of Delphi inquiry to select the ten events for the analysis These events and the spread of opinions for each round are summarized in Figure 2 which indicates not only that there were many changes from round one to two but also that many extreme positions shifted only slightly and others formed distinct poles For several of the more controversial events very few reasons were stated openly in the discussions between rounds From the absense of discussion one might have been led to believe that consensus among the group had been attained Of course it was not known at that point whether the extreme positions would shift in the subsequent ballot It became evident from this ballot that the number of these positions that had not changed was larger than the discussions had indicated And since this same group was willing to disclose their positions in writing it appeared to demonstrate how strongly anonymity can enhance communication This in turn can promote improved forecasts and possibly lead to more effective decisions

The median of the second round of the Delphi results for each event provided the value for initial likelihood of occurrence used in the cross impact analysis The group then estimated the interdependence among the ten events (a one

| TEN MOST IMPORTANT DEVELOPMENTS | RANGE OF OPINIONS REGARDING INITIAL LIKELIHOOD OF OCCURRENCE* | | | |
|---|---|---|---|---|
| | Round One | | Round Two | |
| 1 British entry into the Common Market | UQ - 90<br>M - 79<br>LQ - 60 |  | UQ - 85<br>M - 80<br>LQ - 75 |  |
| 3 Peaceful reunification of Germany | UQ - 29<br>M - 11<br>LQ - 5 |  | UQ - 20<br>M - 10<br>LQ - 5 |  |
| 4 Worldwide open trade with Communist bloc nations | UQ - 70<br>M - 50<br>LQ - 26 |  | UQ - 60<br>M - 50<br>LQ - 30 |  |
| 6 Formulation of federations of European nations | UQ - 70<br>M - 50<br>LQ - 30 |  | UQ - 60<br>M - 50<br>LQ - 20 |  |
| 27 Introduction of an international monetary system (non-gold) guaranteed by international monetary authority | UQ - 79<br>M - 60<br>LQ - 35 |  | UQ - 75<br>M - 60<br>LQ - 50 |  |

*Indicated are the upper quartile (UQ) the median (M) and the lower quartile (LQ) positions for the two rounds of estimation

Figure 2 - INITIAL LIKELIHOODS OF OCCURRENCE

| TEN MOST IMPORTANT DEVELOPMENTS | RANGE OF OPINIONS REGARDING INITIAL LIKELIHOOD OF OCCURRENCE* | | | |
|---|---|---|---|---|
| | Round One | | Round Two | |
| 33 Social and economic homogeneity among Common Market nations | UQ - 70<br>M - 60<br>LQ - 40 |  | UQ - 70<br>M - 60<br>LQ - 50 |  |
| 35 Major warfare between Russia and Red China | UQ - 50<br>M - 25<br>LQ - 10 |  | UQ - 50<br>M - 23<br>LQ - 15 |  |
| 37 Closer relations between European countries and the U S in international enterprise and research fields resulting in stronger ties with the U S than with each other | UQ - 70<br>M - 50<br>LQ - 35 |  | UQ - 40<br>M - 50<br>LQ - 30 |  |
| 39 Four-fold increase in aid (with regard to 1969) to underdeveloped countries by East and West | UQ - 70<br>M - 40<br>LQ - 25 |  | UQ - 40<br>M - 30<br>LQ - 10 |  |
| 42 Ten-fold increase in research capabilities (people plus apparatus and techniques) in Europe and the U S | UQ - 60<br>M - 20<br>LQ - 15 |  | UQ - 50<br>M - 25<br>LQ - 15 |  |

round or so called mini Delphi was used to obtain these inputs) The spread of opinion regarding these factors is presented in Figure 3 Because these data are obtained from a Delphi analysis the range of opinion regarding the cross impacts is also available

In addition to their use in the cross impact analysis the data presented in Figure 3 can be used in many other ways to determine factors related to potential decisions and actions For example the sum of the absolute values of a horizontal row is a measure of the magnitude of the impact that the occurrence of one event might have on the likelihood of occurrence of the other events in the set This is an indicator of the sensitivity of the likelihood of occurrence of the other events in the set to the occurrence of that event or to a change in sequence which accelerates or delays the occurrence of that event Similarly the algebraic sum of a vertical column of cross impact factors is a measure of the sensitivity of the likelihood of occurrence of that event to the occurrence of the others in the set Events which are most sensitive offer the greatest potential for changing out comes and hence may be of greatest interest to a decisionmaker

In addition the spread of opinion (the difference between the upper and lower quartile estimates) regarding each of the cross impact factors may be an indica tion of the uncertainty of the cross impact The sum of the spreads of opinion in the rows of the matrix is indicative of the uncertainty of the group as to the impact of the occurrence of any one event upon the likelihoods of occurrence of the others in the set The sum of this quantity for the columns is therefore a measure of the group s uncertainty that the likelihood of one event will be affected by the occurrence of others in the set

These measures (derived from Figure 3) are presented in Figure 4 Each cell of the matrix in Figure 4 contains two numbers The upper number is the median value of the cross impact factor The lower number is the interquartile range for each cross impact factor (the algebraic difference between the UQ and LQ values) The appropriate sum of each column and each row are given in the shaded column and row From these it can be seen that the events whose occur rence would have the greatest effect on the others in the set are events 33 1 6 27 37 and 42 The events that are most strongly affected by the others in the set are 27 4 39 42 6 and 33 On the other hand the events whose effect on the others is most certain are 39 33 4 42 and 27 The events on which the effect of the other events is most certain are 35 39 42 27 and 3

While the significance of these quantities cannot be exactly evaluated some conclusions are obvious For example the likelihood of occurrence of event 35 is unaffected by the occurrence of all of the other events in the set (the sum of the median cross impact factors as shown in the upper half of column 35 being zero) and there appears to be a high degree of confidence in this zero impact (the sum of the interquartile ranges as shown in the lower half of this column being 1) Conversely event 35 appears to have relatively little effect on the likelihood of occurrence of the other events in the set (the absolute sum of the median cross impact factors in the upper half of row 35 being 4) however there is considerable uncertainty about this low impact (the sum of the interquartile ranges in the lower half of this row being 13) Other events can be similarly evaluated although with far less conclusiveness

These data in conjunction with importance ratings for each event can strongly



| | *THE EFFECT ON THESE EVENTS WOULD BE ** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *IF THIS EVENT WERE TO OCCUR* | 1 | 3 | 4 | 6 | 27 | 33 | 35 | 37 | 39 | 42 | ** |
| 1 British entry | | 0 | +1 | +2 | +3 | +2 | 0 | +1 | +1 | +2 | UQ |
| | | 0 | +1 | +1 | +2 | +1 | 0 | -1 | +1 | +1 | M |
| | | -1 | +1 | -2 | +1 | -1 | 0 | -1 | +1 | +1 | LQ |
| 3 Peaceful reunification | +1 | | +2 | +2 | +1 | +1 | 0 | 0 | +1 | +1 | UQ |
| | 0 | | +2 | 0 | 0 | 0 | 0 | 0 | +1 | +1 | M |
| | -1 | | +1 | -2 | 0 | -1 | 0 | -1 | 0 | 0 | LQ |
| 4 Worldwide open trade | +1 | +2 | | 0 | +2 | +1 | 0 | 0 | +2 | +1 | UQ |
| | 0 | +1 | | 0 | +1 | 0 | 0 | 0 | +1 | +1 | M |
| | -1 | +1 | | -1 | +1 | 0 | -1 | -1 | +1 | 0 | LQ |
| 6 Formulation of federations | +2 | +1 | +1 | | +3 | +3 | 0 | +1 | +2 | +2 | UQ |
| | +1 | 1 | 0 | | +2 | +2 | 0 | 0 | +1 | +1 | M |
| | -1 | -2 | -1 | | +1 | +2 | 0 | -2 | +1 | +1 | LQ |
| 27 Introduction of an inter | +2 | 0 | +2 | +2 | | +3 | 0 | +1 | +2 | +2 | UQ |
| | +1 | 0 | +1 | +1 | | +2 | 0 | 0 | +1 | +1 | M |
| | -1 | 0 | +0 | +1 | | +2 | 0 | -2 | +1 | +1 | LQ |
| 33 Social and economic | +1 | 0 | +1 | +3 | +2 | | 0 | +1 | +1 | +1 | UQ |
| | -1 | -1 | 0 | +3 | +2 | | 0 | +1 | +1 | +1 | M |
| | -1 | -1 | 0 | +2 | +1 | | 0 | 0 | +1 | 0 | LQ |
| 35 Major warfare between | 0 | +1 | +2 | +2 | 0 | 0 | | +1 | 0 | +1 | UQ |
| | 0 | +1 | +1 | 0 | 0 | 0 | | +1 | -1 | 0 | M |
| | 0 | -2 | -2 | 0 | 0 | 0 | | 0 | -2 | 0 | LQ |
| 37 Closer relations between | +1 | 0 | +1 | +1 | +1 | +1 | 0 | | +1 | +2 | UQ |
| | -1 | -1 | 0 | -1 | +1 | -1 | 0 | | +1 | +1 | M |
| | -2 | -2 | -1 | -2 | 0 | -2 | 0 | | 0 | +1 | LQ |
| 39 Four-fold increase in | 0 | 0 | +1 | +1 | +1 | 0 | 0 | +1 | | +1 | UQ |
| | 0 | 0 | +1 | 0 | +1 | 0 | 0 | 0 | | 0 | M |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | LQ |
| 42 Ten-fold increase in | +1 | 0 | +1 | +2 | +1 | +2 | 0 | +2 | +2 | | UQ |
| | +1 | 0 | +1 | +1 | 0 | +1 | 0 | +1 | +1 | | M |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +1 | | LQ |

A positive sign (+) indicates the effect of the occurrence of the development will be to increase the likelihood of occurrence of the subsequent development and a negative sign (-) indicates the converse The strength of the impact is indicated by the following code 0 = No Impact 1 = Minor Impact 2 = Strong Impact and 3 = Very Strong Impact

** UQ = Upper Quartile M = Median LQ = Lower Quartile

Figure 3 RANGE OF OPINIONS REGARDING CROSS IMPACT FACTORS

| IF THIS EVENT WERE TO OCCUR | | THE EFFECT ON THESE EVENTS WOULD BE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 3 | 4 | 6 | 27 | 33 | 35 | 37 | 39 | 42 |
| | Σ | +1 | +1 | +7 | +5 | +9 | +5 | 0 | +2 | +7 | +7 |
| | | 16 | 11 | 14 | 19 | 10 | 13 | 1 | 15 | 8 | 9 |
| 1 British entry | 8 / 13 | | 0 / 1 | +1 / 0 | +1 / 4 | +2 / 2 | +1 / 3 | 0 / 0 | −1 / 2 | +1 / 0 | +1 / 1 |
| 3 Peaceful reunification | 4 / 13 | 0 / 2 | | +2 / 1 | 0 / 4 | 0 / 1 | 0 / 2 | 0 / 0 | 0 / 1 | +1 / 1 | +1 / 1 |
| 4 Worldwide open trade | 4 / 10 | 0 / 2 | +1 / 1 | | 0 / 1 | +1 / 1 | 0 / 0 | 0 / 1 | 0 / 1 | +1 / 1 | +1 / 1 |
| 6 Formulation of federations ... | 8 / 16 | +1 / 3 | −1 / 3 | 0 / 2 | | +2 / 2 | +2 / 1 | 0 / 0 | 0 / 3 | +1 / 1 | +1 / 1 |
| 27 Introduction of an inter . | 7 / 12 | +1 / 3 | 0 / 0 | +1 / 2 | +1 / 1 | | +2 / 1 | 0 / 0 | 0 / 3 | +1 / 1 | +1 / 1 |
| 33 Social and economic | 10 / 8 | −1 / 2 | −1 / 1 | 0 / 1 | +3 / 1 | +2 / 1 | | 0 / 0 | +1 / 1 | +1 / 0 | +1 / 1 |
| 35 Major warfare between | 4 / 13 | 0 / 0 | +1 / 3 | +1 / 4 | 0 / 2 | 0 / 0 | 0 / 0 | | +1 / 1 | −1 / 2 | 0 / 1 |
| 37 Closer relations between .. | 7 / 16 | −1 / 3 | −1 / 2 | 0 / 2 | −1 / 3 | +1 / 1 | −1 / 3 | 0 / 0 | | +1 / 1 | +1 / 1 |
| 39 Four-fold increase in | 2 / 5 | 0 / 0 | 0 / 0 | +1 / 1 | 0 / 1 | +1 / 1 | 0 / 0 | 0 / 0 | 0 / 1 | | 0 / 1 |
| 42 Ten-fold increase in | 6 / 10 | +1 / 1 | 0 / 0 | +1 / 1 | +1 / 2 | 0 / 1 | +1 / 2 | 0 / 0 | +1 / 2 | +1 / 1 | |

Figure 4 STRENGTH AND UNCERTAINTY AMONG CROSS IMPACT FACTORS



aid the decisionmaker in identifying desirable actions and areas warranting further investigation Important events which are insensitive to the others in the set would appear to necessitate direct action if they are to be strongly modified whereas sensitive events may benefit from indirect action Events that exhibit a wide uncertainty would appear to merit a closer evaluation before decisions are taken

In the case study the group was asked to consider candidate events whose likelihood of occurrence they felt could be changed by social actions and to indicate the direction of change which they believed would be most desirable Four such events were chosen and their initial likelihoods of occurrence per turbed in accordance with the group s desires These changed events were in cluded as pairs in two successive cross impact analyses Because of time con straints it was not possible to repeat the analysis of the cross impact matrix as often as would ordinarily be done or even to analyze the variances in the columns and rows of the matrix prior to making the selection of the four events Had such information been available these selections might have been consider ably different

Examining the candidate actions in retrospect and in light of the information presented in Figure 4 is quite revealing The events the group felt they could and would like to perturb were (in order of preference) 39 27 6 and 42 It can be seen from the data in Figure 4 that their first choice event 39 has the least impact on the likelihood of occurrence of the other events but is highly affected by their occurrences It is clearly a good candidate for indirect support Event 42 has similar characteristics and may also be regarded as a poor candidate for direct intervention Events 27 and 6 on the other hand appear to be more effective candidates although the occurrence of even 27 is also very strongly affected by the other events

The most interesting candidate for action appears to be event 1 This event has a very strong effect on the others in the set and is virtually unaffected by any of them This event however was not chosen for the cross impact analysis perhaps because of the group s uncertainty regarding these interactions This uncertainty is indicated by the high interquartile ranges in both the column and the row of event 1*

The results of the cross impact analysis are presented in Figure 5 Shown are the initial and final probabilities of each event for the case without social inter vention and the two cases with interventions

It can be seen from these results that the effect of the cross impact factors in general is very large whereas the actions taken had relatively little across the board impact on the other events However only the initial probabilities were perturbed in this analysis and as mentioned earlier several of these events are not powerful They may have exhibited greater sensitivity to sequence than to initial probabilities or other combinations may have revealed their impacts Further analyses would have clarified these matters

The analytic procedure used in the case study provided the group with many

*It should be noted that none of these observations could have been made if the cross impact factors had not been obtained through the use of the Delphi technique

| | EVENTS | WITHOUT INTERVENTION | WITH INTERVENTIONS NOTED | |
|---|---|---|---|---|
| | | Future A INITIAL/FINAL PROBABILITIES | Future B INITIAL/FINAL PROBABILITIES | Future C INITIAL/FINAL PROBABILITIES |
| 1 | British entry into the Common Market | 80/ 80 | 80/ 81 | 80/ 81 |
| 3 | Peaceful reunification of Germany | 10/ 08 | 10/ 08 | 10/ 08 |
| 4 | Worldwide open trade with Communist bloc nations | 50/ 65 | 50/ 66 | 50/ 67 |
| 6 | Formulation of federations of European nations (consisting of groups of present nations) | 50/ 65 | (70/ 84) | 50/ 66 |
| 27 | Introduction of an international monetary system (non-gold) guaranteed by international monetary authority | 60/ 87 | (80/ 95) | 60/ 88 |
| 33 | Social and economic homogeneity among Common Market nations | 60/ 74 | 60/ 78 | 60/ 75 |
| 35 | Major warfare between Russia and Red China | 23/ 23 | 23/ 23 | 23/ 23 |
| 37 | Closer relations between European countries and the U S in international enterprise and research fields resulting in stronger ties with the U S than with each other | 50/ 52 | 50/ 53 | 50/ 53 |
| 39 | Four-fold increase in aid (with regard to 1969) to underdeveloped countries by East and West | 30/ 47 | 30/ 49 | (50/ 73) |
| 42 | Ten-fold increase in research capacities (people plus apparatus and techniques) in Europe and the U S | 25/ 40 | 25/ 42 | (45/ 66) |

(Items circled had their initial probabiliites raised These increases reflected the direct effect of possible societal actions

Figure 5 CHANGE IN PROBABILITIES OF OCCURRENCE RESULTING FROM THE CROSS IMPACT ANALYSIS



new insights into future prospects with which they were highly concerned and to which they had given considerable thought Because it was performed primarily as a demonstration detail and completeness were neglected This compromised the substantive results strongly The most serious limitation of the demonstration was that the analysis was not repeated many times Even so the value of the technique in promoting an appreciation of complex social issues and its potential for evaluating outcomes were apparent to most members of the group

In light of these and other results research has continued to make the cross impact technique more effective Certain promising innovations are currently being programmed for operation on digital computers at the Institute for the Future These changes address several of the difficulties mentioned earlier which were apparent in the procedure used in the case study

For example as indicated earlier the initial likelihood of occurrence of an event considered an environment which might have evolved normally from present circumstances This could conceivably have included the anticipation of the occurrence of events included in the set being analyzed

Consequently the analysis that is made which adjusts the initial probabilities in light of the occurrence of an event may be adding to what has already been partially included by the participants In any event it does not account for non occurrence in assessing the interrelationships Therefore the analysis does not remove any cross impact effects which may have been implicity included in originally estimating the initial likelihoods of occurrence Finally the use of a mathematical analog (quadratic equation) to quantify the subjective inputs received from the participants may be questioned

The changes being explored are as follows (1) the criteria for determining the initial likelihoods of occurrence for the events being evaluated will be changed to assume the *non occurrence* of all of the other events in the set and a normal evolution for other environmental factors (2) the cross impact factors will be elicited quantitatively in terms of how much more or less likely each subsequent event will be if preceded by the occurrence of any other single event and (3) the cross impact matrix will be analyzed directly without the quadratic equation transformation

The changes in criteria regarding what is to be considered and neglected in estimating the initial likelihood of occurrence and the manner of estimating the cross impact factors—in terms of quantitative changes in likelihood rather than by some qualitative statement—are both intended to make the analysis more specific The use of changes in likelihood also expands the domain of possible change as will be discussed later It is not maintained however that these modifications of the technique make the task of eliciting accurate information easier On the contrary it may be argued that in several ways it makes that task more difficult For example an expert may find it impossible to assume the non occurrence of many important events simultaneously Similarly he may find it quite burdensome to judge changes in likelihood on a scale which ranges from near zero to near infinity Nevertheless these changes in methodology do overcome several other shortcomings which appear to represent greater constraints

Should the judgmental process involved in assuming the non occurrence of all of the other events in the set prove too difficult it is possible to revert to eliciting

individual probabilities assuming a normal evolution and to include two cross impact factors in each cell—one for the occurrence and one for the non occurrence of each event This would of course double the data requirements for the cross impact matrix

The result of using the quadratic equation is to confine the effect of one impact to the domain presented in Figure 6 which shows the initial and final probabilities for cross impact factors These factors may range only from +1 to −1 The effect of the occurrence of one event on another can be determined by entering the Figure with the initial probability of the event being impacted reading up to the value of S that represents the cross impact factor between the two events and reading across to obtain the new probability

From Figure 6 it can be seen that when the cross impact factor (S) is zero the impacted probability is the same as the initial probability For values of S other than zero the impacted probability is increased or decreased according to the magnitude and sign (+ or −) of S and the initial probability of the event being impacted In order for the quadratic equation to satisfy the constraint that the probability can never exceed unity or become negative the domain has to be constrained to values of S ranging from +1 to −1 Such a limitation is not intuitively clear in that it does not permit the occurrence of one event to have a large positive absolute impact on an event whose initial probability is very low or a large negative absolute impact on an event whose initial probability is very high

Changes in probability in the form of quantitative ratios opens the domain to the widest range of possibilities Several of these are presented in Figure 7 in a form comparable with the previous Figure From Figure 7 it can be seen that an event whose initial probability was 20 percent could if impacted by an event that increased its likelihood by a factor of 20 be raised to 83 percent When the quadratic is used the maximum positive impact for an event with an initial probability of 20 percent is to raise it to 36 percent

## CONCLUSIONS

The approaches described in this program are still highly experimental and far from their final form Nevertheless their contribution can be important particularly since many techniques currently being used to plan and make decisions in complex situations seem unsystematic and appear to admit actions that may be inefficient or work at cross purposes

Indeed there is still much to be accomplished before futures analysis can be regarded not as a science but even a respectable art The key problems of organizing and understanding the issues and assessing the desirability of alternative outcomes which are crucial to such an analysis have been discussed only incidentally here and hence a complete analysis has been impossible The task of this paper has simply been to suggest several ways in which the Delphi technique and cross impact analysis provide an appreciation of the interplay of individual problems and of opportunities that can be foreseen Moreover these methods do so in a highly comfortable manner in the sense that they do not change basic thought processes or logic but rather use these processes systematically



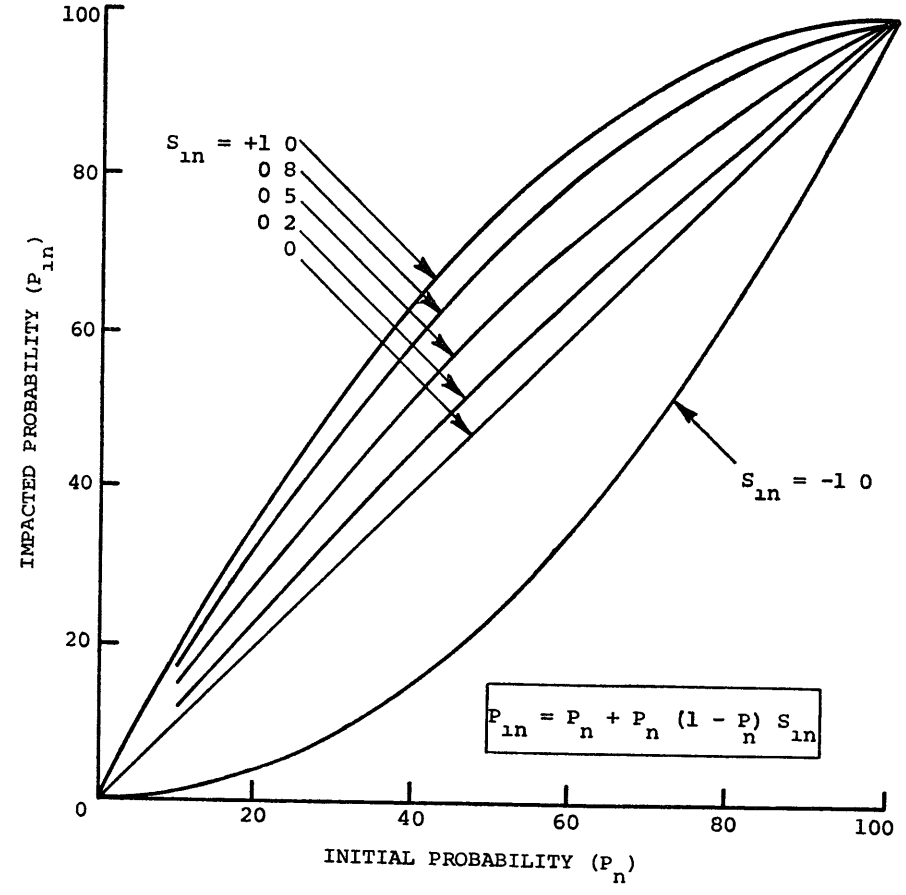



Figure 6 - EFFECT OF CROSS-IMPACT FACTORS WHEN USING QUADRATIC EQUATION

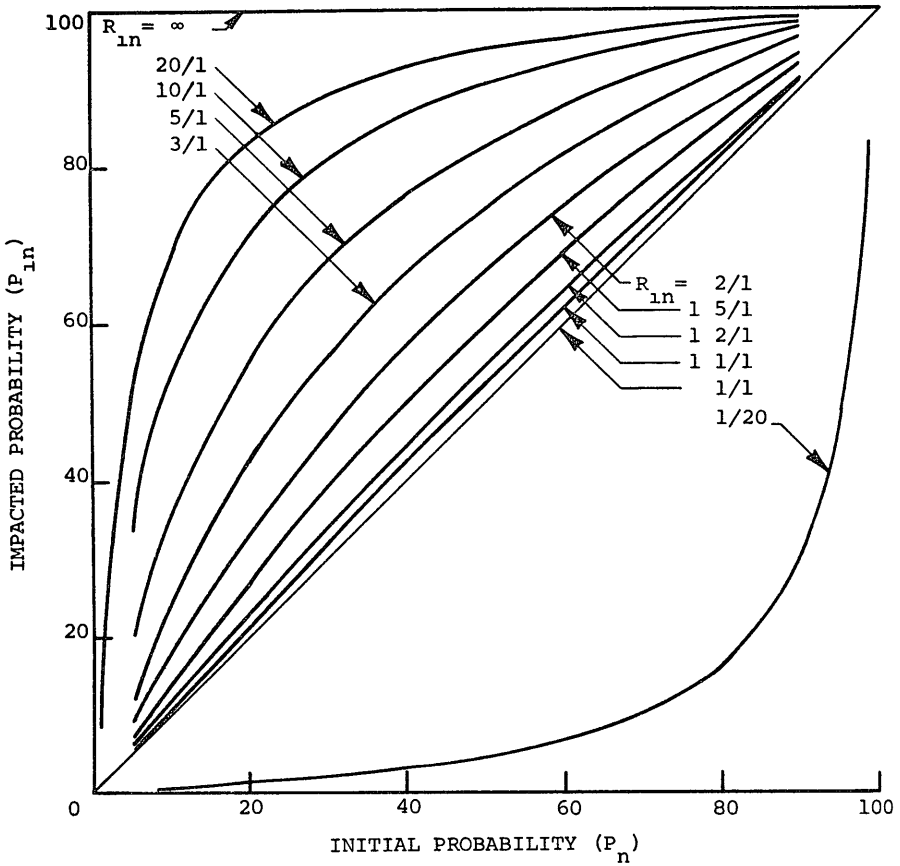



Figure 7 - EFFECT OF CROSS-IMPACT FACTORS WHEN USING CHANGES IN LIKELIHOOD



amplifying their implications in a retraceable manner Because an opportunity is provided to trace ideas back to their origins these techniques can be especially valuable in gaining the broad acceptance of proposed actions that is often essential where decisions will affect large segments of society

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# ASSUMPTIONS ABOUT MAN AND SOCIETY AND HISTORICAL CONSTRUCTS IN FUTURE RESEARCH

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This paper rests on two premises One is that disciplined inquiry into and about the future in the variety of forms that it takes is an increasingly serious respect able and important form of intellectual activity the second is that those engaged in such inquiry share a strong common interest in improving the state of their art

The central aim of this paper is to urge futures researchers to become self consciously aware of the character of the intellectual equipment required by the tasks they set for themselves and consequently more acutely sensitive to their own intellectual limitations as well as strengths It seeks to realize this aim by lifting to a position of high visibility two elements that are unavoidably present in their work whether it is conceived of as an activity in forecasting prediction scenario writing probabilistic assertions about future states inventing possible futures or in some other way One element consists in the historical constructs that futures researchers fashion for themselves or borrow from others The second lies in the character of the assumptions they make about human behavior both individual and group

On both of these matters much of course has been said in the literature of futures research and on futurology and more no doubt will be said during this major International Future Research Conference at Kyoto If it were neces sary to justify a concern with these two aspects of inquiry into the future it could be argued that what has already been said about their importance often with force and cogency has not always been heeded I doubt however whether this contention needs to be documented here It should be sufficient to flag the dangers associated with the practice of what with some exaggeration and some rudeness may be labelled instant history and instant social science in the conduct of futures research In short this paper may be read as a cautionary tale designed to enhance the sophistication and thus the competence of futures researchers with respect to two critical dimensions of their intellectual activities

## I

I propose to make believe that those who are engaged in inquiries focussed on the future of whatever time dimension and irrespective of method are operating as historians of the future Next I propose in order to provide a working description of futures research to adopt Johan Huizinga s conception of history as the intellectual form in which a civilization renders account to itself of its past [1] and to describe futures research as the intellectual form in which a soci ety renders account to itself of its possible and probable futures

In the context of this conception of his work the historian of the future should recognize that every society carries within itself one or more interpreta tions of what it is Each interpretation is a constellation—an ensemble—of observations ideas notions and images which as a whole provide a sense of structure for the society and inform it with meaning Moreover the historian of the future should understand that the society with which he is dealing may be viewed as a symbolic system that is open both to varying if not grossly different delineations and to analysis as a configuration of myths that serve among other things to endow it with apparent coherence and to provide a source of cohe siveness If the futures researcher takes this configuration of myths at face value the cast of his operations and consequently their outcomes will be profoundly affected The historian of the future is poorly armed indeed if he is unaware for example of the demythologizing function performed by the social and behavioral as well as by all other sciences if he does not understand the manner in which these sciences strive to substitute for a common sense interpretation of reality a different a scientific interpretation of reality [2]

One contemporary historian speaks of history as a harlot and a hireling but he does so to drive home the point that history serves best those who suspect her most [3] Similarly it may be said that futures research serves best those who suspect it most Certainly one path to a stance of suspicion that is disciplined and positive in its consequences is the cultivation by the futures researcher of a strong compulsion to unearth and understand the things he takes for granted

Having invoked the image of the historian of the future it is apposite to recall that it amused Henry Adams to observe early in this century that the historians of his day were in contrast to himself neither deliberate nor sophisti cated spectators of their own thoughts and acts Had they been charged with responsibility for the assumptions which undergirded their writings he declared they would have maintained their innocence with the contention that they had never supposed themselves required to know what they were talking about [4] Adams barbed comment was neither carefully considered nor just but the mes sage it carries is pertinent to the work of the futures researcher It was restated in Karl Mannheim s dictum The most important thing that we can know about a man is what he takes for granted and the most elemental and important facts about a society are those that are seldom debated and generally regarded as settled [5]

The significant issue is not whether the futures researcher takes anything for granted but *what* he takes for granted in particular what his assumptions are about man and society and how these affect his operations For in futures research as in other fields of intellectual inquiry the substance of what a man takes for granted may stand as evidence for what he may neither perceive nor understand simply because the futures researcher is a feeling as well as a thinking being Consequently the practitioners of futures inquiries have as do others an intellectual obligation to know themselves To understand himself however modestly a man must also know something about the life the experiences and the behavior of other men However it is also the case that what he knows and believes to be true about himself establishes in some degree a frame of reference for intelligible comprehension of others To recognize the bearing of personality or of individual or group experience upon statements about events conditions circumstances or developments that have not yet occurred—or it must be noted upon those that have—is in effect equivalent to asserting the central position of knowledge about human behavior about man and society in the intellectual equipment of the futures researcher



## II

It should not be necessary to underscore the fact that human beings and human life stand at the center of the concerns of historians of the future Whether their work takes the form of anticipating forecasting predicting inventing or speculating about any dimension of the future it remains defined by sets of problems involving the probabilities and options for social changes the processes of such changes and the outcomes of those changes Yet in the light of a good part of the futures research literature emphasis upon this common place and an elaboration of its implications for the intellectual equipment of the futures researcher may be pardoned

The ideally equipped historian of the future should be able to operate as if he were a cultural anthropologist an economist a political scientist a linguist a psychologist a social psychologist a geographer a historian a systems analyst an applied mathmetician a humanist and at least on occasion a behavioral psychiatrist In this day and age no mere mortal can meet this ideal set of qualifications Polymaths have been rendered extinct by specialization in the generation of knowledge and by the growth in its volume and forms

The futures researcher therefore can only accept the rude reality that much if not most of his work is conducted on the basis of—and both influenced and limited by—the knowledge systems empirical and theoretical fashioned by others who wear distinctive disciplinary badges At best the futures researcher can attain a high level of competence in a few and a measure of familiarity with a larger number of discipline structured knowledge systems To say that he can acquire familiarity with them is to assert that his knowledge of their content is partial Yet he must act as a partisan with respect to this partial knowledge in the sense that he must commit himself to its use its application

## III

These observations are not to be read as a bill of deficiencies from which

futures researchers suffer They simply describe the situation in which the historians of the future unavoidably find themselves The fact is that their work is in greater or lesser measure not only constrained but also made possible by bodies of knowledge largely the province of other specialists that they are compelled to take for granted Consequently what should concern the futures researcher is not that a wide range of assumptions about man and society about individual and group behavior or about the meaning of past human experience is embedded in and thus shapes his operations His concern rather should be directed toward cultivating a critical sense with respect first to the substance and scientific quality of the assumptions he makes and second to their bearing upon his work

The assumptions about man and society made by the futures researcher with respect to which his position is primarily that of being a consumer rather than a generator of what passes for knowledge are numerous and diverse They range from loose broad conceptions—sometimes applied as if they constituted general scientific laws and sometimes as reasonable hypotheses—to what may be described as affirmed scientific propositions of a limited nature In short what is contained within his knapsack of assumptions about social and individual behavior may at the very worst constitute bodies of popular myth or at the very best mirror the state of knowledge in the social and behavioral sciences

The futures researcher has an obligation consequently to strive for more than a superficial view of these sciences which share in common as has been observed a search for underlying order in the midst of superficial randomness and complexity in human affairs to show that man is a part of nature not just a contingent intruder into an otherwise lawful world [6] He should be aware moreover of the differences among their disciplines and of the different styles within disciplines [7] He should understand that because much of their knowledge admittedly is fragmented much is based on limited verification and many propositions are only approximate explanations of complex social and behavioral phenomena [8] he is not freed from the task of learning where and in what ways the social and behavioral sciences are pertinent to his work

On the contrary the historian of the future is constantly invited to learn what they have to say about human affairs because the assumptions he makes about human behavior directly affect four interconnected aspects of his operations (1) the selection and perception of the problems he sets for himself (2) the parameters he establishes so as to render these problems soluble (3) the determination of his heuristic activities and (4) the adoption consciously or unconsciously of notions of causality

## IV

The assumptions about human behavior inevitably made by futures researchers are likely for example to include general conceptions concerning human nature the purposes and character of social organization and the process and direction of social development They are also likely to embrace less grand theories concerning the influences of heredity and environment in human development the nature and constitution of cultures patterns of political and economic behavior the motivations of individuals and groups the characteristics (if not the character ) of national ethnic or racial groups and class structure In addition futures researchers are likely to take for granted various propositions strongly supported if not satisfactorily validated by empirical evidence relating to learning processes the nature and function of memory nonrational and irrational behavior opinion and attitude formation and change the determinants and roles of social status the determinants and processes of social occupational and geographic mobility as well as of cultural including technological diffusion



One or more items in this array of conceptions theories hypotheses or propositions about human behavior may become the direct concern of the futures researcher and even define the focus of his work However his normal posture toward the whole body of social and behavioral science knowledge is to regard it as the province of the several distinctive disciplines that deal with man and society as their subject matter This obviously is one of the fruits of specialization in intellectual function and effort In the practice of his particular craft or art the futures researcher generally and understandably leaves it to the specialists in these disciplines—anthropology economics geography history human genetics linguistics political science psychology sociology and still others—to formulate hypotheses propositions theories and laws to establish their validity and consequently utility for him and to provide empirical data pertinent to his inquiries Whatever the standing of the knowledge and methods of these different disciplines within each of them within the context of his work they tend to have the status of matters taken for granted by the futures researcher

The grounds for this contention are two fold The futures researcher is likely (1) to be sufficiently persuaded of the merit or validity of the knowledge and methods of the sciences of human behavior to feel under no pressure to examine them in depth and seek to confirm them or (2) even when he has reservations about them to accept them as if they were valid because the nature of his inquiry in effect prevents him from submitting them to test and evaluation The first is a matter of belief the second a function of economy in research

## V

I remarked earlier that assumptions about human behavior have a bearing upon the notions of causality adopted either consciously or unknowingly by historians of the future The basis for this assertion lies in the fact that statements about future conditions circumstances developments and the like may properly also be perceived as statements about processes of change and their outcomes The latter of course are explicit in the work of the futures researcher but processes of change are commonly only implied

Statements about the future normally take one of two forms They assert (1) that if such and such exists in State A at a given time it will be in State B at some future time or (2) that if State A is present at a given time then there is such and such a probability that State B will occur later Clearly two aspects of his operations matter enormously for the futures researcher One is how he perceives or construes the initial state The second is the set of causal explanations that he

invokes to render a judgement about a change in state or about the probable occurrence of successive states satisfactory—that is to say persuasive—at least to himself The nature of change processes occurring in the future of course are not susceptible to direct inquiry They can be investigated only when they have become past events Thus the nature of future change processes may be imputed from statements about outcomes—from the new states about which assertions are made—or they may be assumed *a priori* which is what the futures researcher normally does

It can be maintained that the problems including those of methodology which engage the futures researcher are inquiries into social change regardless of the label employed to identify their focus or limits on the ground that they deal with social behavior intentions institutions organizations systems artefacts or the like Inevitably the researcher postulates one or more models or patterns or conceptions of uniformities which serve to render the complexities subtleties untidiness and dynamics of human life intelligible to himself and useful in the conduct of his inquiry He constantly invokes a variety of models that serve this function—whether of an economic a technological a political a demographic an international or of some other character—even when he is not consciously attempting to fashion them They constitute a major part of the contents of his knapsack of assumptions

The futures researcher should therefore be aware that the chances are very high that more than one model of a rational and plausible character can be borrowed or constructed for the various social systems with which he deals If he is sensitive to this he will be disposed to search out and utilize models that meet not only the requirements of rationality and plausibility but also those of testability and convergence with such data as may be available Moreover he will also recognize that models of dynamic systems are charged so to speak with powers of explanation They provide in short causal pictures of processes of change and of the results that flow from these processes This recognition in turn should invite him to ask whether or not there are embedded in his models assumptions about human behavior that are at odds with current bodies of specialized knowledge The task of the historian of the future involves an additional difficulty because he is also invited to make assumptions about man s *future* goals values standards styles of thought and the like and in so doing sort out the trivial from the significant Each assumption in this area clearly is attended by high uncertainty and even when properly handled with all due caution may still be critical to the tenor and result of his inquiry

## VI

The second of my two themes—the role of historical constructs in futures research—has already in part been developed Moreover it has been illuminated by Dr Nakayama s opening address of this conference on the Economic Development of Japan Reconsidered He showed how crucially important a particular recapitulation and reading of Japan s history over the past century is in shaping if not determining one or more plausible views of its prospective economic social cultural and political life



Since the futures researcher is not a practising historian he is likely to enjoy a somewhat optimistic and simple view of what is involved in the intellectual form in which a civilization renders account to itself of its past [9] He perhaps needs to be reminded that the revision of history—the rewriting of history—is a distinguishing and positive feature of the discipline It has been remarked—and not with malice—that History is the revision of outlooks not of opinions It is not the correction of factual errors within a static control It is a modification of the mode of making errors [10] The futures researcher should also be aware of Charles Peguy s observation that every historian sins against the past by giving it a sense of order symmetry or coherence that it did not possess and moreover understand that the sin is both a necessary and creative intellectual act

This kind of sin is one to which the futures researcher is peculiarly susceptible because of two considerations The nature of his inquiries dictates first that his delineation of the present or past is the product of high selectivity of an act of conscious reductionism and second that it entails the adoption of models of historical processes that provide a basis for rendering a plausible picture of some future state In greater or lesser degree he is engaged in the business of recapitulating some aspect of the past in order to establish a present or initial state or of adopting from the existing body of historical literature what strikes him as meaningful and acutely pertinent recapitulations in the light of his inquiries However skilled he may become in the use of the fruits of historical scholarship his intellectual operations are not those of the trained historian even though I earlier proposed to make believe that he could be viewed as a historian of the future Certainly it is highly unlikely that he would perceive as applicable to him the challenge that Professor J H Plumb directs to the historian in asserting that while it is the latter s business to make sense of the past it is his duty to reveal the complexities of human behavior and the strangeness of events [11] The future researcher s use of history drives him toward simplification of the past while the researches of professional historians make for an increasingly complicated sense of the past [12]

To guard against misunderstanding I hasten to add that historians also undertake recapitulations of yesterday s history even though their yesterdays may be the eve of the French Revolution the situation in which Franklin D Roosevelt found the United States when he became President or the economic changes that led to the erosion of medieval conceptions of usury However their research findings on and judgements about what may be called here initial states are subject to scrutiny and criticism by highly specialized fellow members of their guild who do not hesitate to speak out when they find faults or differ in interpretation The future researcher however is not likely to encounter sensitized interest among his fellow workers and peers in the historical recapitulations he presents And what is more important even if they should be sensitive on this score it is most unlikely that they are armed with the intellectual style habits and competence of the professional historian Nor is there good reason to expect them to be so armed their metier is not that of the historian

This means however that they should at least be aware that the history of human experience is not singular It is plural and the histories of human experience may be viewed as competitive and complementary even when they are not conflicting The burden and meaning of the past that establishes the present or

initial state for the futures researcher is not given it is a function of his choice And that choice will depend first upon how he perceives and defines his own task and second upon bodies of historical knowledge—within which are included angles of vision and assignments of meaning as well as hard data—created by others

The selection of and commitment to a particular view of a dynamic changing past that has so to speak crystallized in a momentarily frozen present is crucially important Two concepts borrowed from the field of genetics may be employed (and somewhat abused it should be admitted) to suggest the kind of role played by historical constructs in futures research—namely the masking of the unwanted and its contrary the masking of the wanted [13] The choice of a particular set of dimensions of the past to delineate with great economy significant features of a present or initial state which may also explain how they came to be implies that other dimensions of the past are as a matter of calculated decision dismissed suppressed bypassed or ignored as being irrelevant or only trivially related to a research task At the same time that choice serves to establish the distinguishing features of some future state that is the objective of the inquiry Thus the choice and application of historical constructs in futures research may be viewed as performing the linked function of masking or hiding a vast number of aspects of the past that in order to render an inquiry manageable are treated as unwanted and of unmasking or disclosing a limited number of aspects of the future that are dealt with as wanted

## VII

Although they may be analyzed as separate elements in futures research historical constructs and assumptions about human behavior are in fact inextricably intertwined and are interactive in the intellectual procedures and practices of the futures researcher This point should be virtually self evident For just as sets of notions about the *how* and the *why* of individual and group behavior influence the selection and utilization of historical constructs so do the fruits of historical inquiry and synthesis affect the nature of assumptions about man and society with which the futures researcher works [14] It has been observed that the investigator of social action —and this is not an inappropriate label for the futures researcher— confronts a world which has been preinterpreted and even preconstituted and which is held together by the cosmic glue of significant symbols [15] In futures research both the meanings assigned to the past and the representation of present states as well as operative assumptions about human behavior constitute much of the universe of significant symbols

I stated that one premise of this paper is my belief that those engaged in disciplined inquiry into and about the future share strong common interests in improving the state of their art That is my reason for focussing attention upon two elements present in their work whatever their methodologies that render it peculiarly susceptible to misdirection and error [16] These to repeat are what they take granted—assume—about human behavior and the historical constructs they employ in postulating present or initial states—their baselines for prediction forecast conjecture and the like Finally that premise is my warrant for contending that heightened awareness of their significance accompanied by sensitized understanding of their function would contribute to reducing the distance that now lies between claim or aspiration on the one hand and performance on the other in so much of the literature on the future



Notes

1 Johan Huizinga A Definition of the Concept of History in Raymond Klibansky and H J Paton eds *Philosophy and History Essays Presented to Ernest Cassirer* (Oxford The Clarendon Press 1936) p 9
2 Arvid Brodersen Some Notes on Reality Orientation in Contemporary Societies (Unpublished Paper 1969) deals with recent European studies relevant to this theme
3 Herbert Butterfield *The Whig Interpretation of History* (London G Ball & Sons 1931) p 131 See also his *Human History and Human Relations* (London Collins 1951) pp 158ff
4 Karl Mannheim *Ideology and Utopia* (New York Harcourt Brace 1936) p xxiv
5 Henry Adams *The Education of Henry Adams An Autobiography* (London Constable & Co Ltd 1919) p 382
6 *The Behavioral and Social Sciences Outlook and Needs* A Report by the Behavioral and Social Sciences Survey Committee under the Auspices of the Committee on Science and Public Policy National Academy of Sciences the Committee on Problems and Policy Social Science Research Council (Washington D C National Academy of Sciences 1969) p 69
7 The social sciences sometimes rely upon a qualitative description and sometimes on sophisticated mathematics sometimes they turn to the laboratory for the methods and data of experiments sometimes to sample surveys and opinion polls sometimes to the method of the interview and sometimes to patient observation and interpretation Sometimes they appear preoccupied with plodding descriptions of facts—facts that appear very dull and even superficial when viewed in isolation Sometimes they soar to heights of abstraction that leave factual details well behind Sometimes they moralize but at their best they seek to understand before evaluating *Ibid* p 86
8 *The Behavioral Sciences and the Federal Government* Advisory Committee on Government Programs in the Behavioral Sciences National Research Council National Academy of Sciences Publication 1680 (Washington D C National Academy of Sciences 1968) p 2
9 See above p 42
10 John William Miller Afterword in Jose Ortega y Gasset *History as a System and other Essays Toward a Philosophy of History* (New York Norton & Company Inc 196) p 255
12 Richard Pares *The Historian s Business and Other Essays* (Oxford Oxford University Press 1961) p 10
13 See *Report of the President 1968–1969* Carnegie Institution p 14
14 Of the numerous examples of this point two very different items in the literature of futures research may be cited Arthur I Waskow Looking Forward 1999 in Robert Jungk and Johan Galtung eds *Mankind 2000* (London Allen & Unwin 1969) and Peter F Drucker *The Age of Discontinuity* (New York Harper and Row 1969)
15 John G Gunnell *Political Philosophy and Time* (Middletown Conn Wesleyan University Press 1968) pp 19–20

16 See for example Otis Dudley Duncan Social Forecasting the State of the Art *The Public Interest* no 17 Fall 1969 pp 88–118 *passim*

# TYPOLOGICAL SURVEY OF FUTURES RESEARCH DEVELOPMENT PROGRAM OUTLINE

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## SUMMARY

The interim report outlines the first phase study carried out under the support of the U S National Institute of Mental Health during the period from June 1969–June 1970

This initial regional study focussed upon the current state of futures research in the U S A and provides a *typological analysis* of such work along the following lines

(i) identifying *the major organisations and individuals* engaged in formal programs of futures research
(ii) *the disciplinary concentrations and institutional linkages* in the field including age sex and other characteristic distributions
(iii) *orientations* the type of audience to which work is directed its methodological orientation forecasting range etc
(iv) *societal linkages* identification of sponsoring agencies and support structure
(v) *information networks* to whom for what purpose and in which form the work done in this field is presented

As the pilot phase of this U S study nears completion the second phase *international typological survey* has been inaugurated This will now be developed in collaboration with major collaborating centers in various countries around the world FUTURES Journal England is also cooperating in this phase of the study by publishing and distributing the basic guide questionnaire for use in this international survey

## DEVELOPMENTAL OUTLINE OF THE SURVEY PROGRAM

### The U S Study

The interests which generated this study arise from the rapid growth of futures research in recent years and the proliferation of this activity in many sectors of

society It was felt however that a simple large scale survey of future oriented work would be insufficient to provide a useful profile of major contributions in the field which would also afford more detailed information on range of forecast ing work being done the allocation of human and fiscal resources the gaps and omissions in the field etc

Specific interest was focussed therefore on a *typological analysis* of those major activities by organisations or individuals which were formally identified as futures research long range forecasting etc —as distinguished from standard business government and socio economic projections

It was felt also that such a typological assessment would assist in identifying the linkage of futures research to other long range planning processes and directions and might give a clearer picture of the overall relationship of futures thinking to various areas of society—to education the youth movements and various other informal and formal change agencies

A guide/questionnaire was developed for circulation and the information afforded by this was supplemented through personal bibliographical files con sultation correspondence etc to elicit and compile information under the following headings

**A The disciplinary concentrations** and linkages in this area of research identifying which fields of human inquiry are represented which are missing etc and through this analysis of disciplinary concentrations—to ask how these may affect the overall field in various ways

Related to the above would be *the age mix* whether most work is conducted by those of relatively advanced professional standing and therefore of age The sex ratio of workers might also be of relevance here These factors have a bearing on the conceptual and theoretical premises on which futures models are based

**B A profile on orientations,**

(i) *as defined by the stated* objectives of agencies centers and individuals—showing to whom their work is directed and/or communicated What is its direct or indirect relation to the local or national policy and planning process? How is it related to education—either by involving students or other members of the larger community in its work? How does it view itself in relation to the overall society?

(ii) *Range of forecasting* i e short medium or long range etc whether it is specifically focused on one sector, e g , the future of medical services of employee benefit or is more globally oriented

(iii) *Methodological orientation* To determine which methods are most typi cally used by different types of centers e g Delphi techniques data analysis and extrapolation gaming simulation scenario building etc

This may be partially determined by the disciplinary orientation of the Center s staff and/or by the developmental characteristics of a given area e g gaming and simulation techniques in business and industry technological forecasting in weaponry assessment

**C Sector linkages**

(i) Who the sponsoring agencies are for specific types of centers e g industry government academic religious etc



How institutional support is allocated—in terms of which planning objective agency mission specialized research direction etc

Such information in relating the research to its support sector in the society could help determine within the overall typology where (and possibly why) various gaps and omissions in the overall field of futures research may occur It might also indicate therefore where resources might need to be allocated

(ii) *Location of centers* i e in both geographical and institutional locational terms To ask what clustering pattern if any is apparent and how this relates to other typological factors

**D Communications**

(i) As partially addressed in the orientation section above these questions might show to whom futures research findings are addressed and attempt to profile the audience for a given range of inquiry It might also demonstrate how much work is restricted —i e in terms of security by client/contract relation by its model of communications etc

(ii) *Within the field itself* show how the work is presented i e via which journals conferences symposia etc to elicit what the information networks are in the field to ascertain whether key disseminating and documentation centers can be identified and to seek to identify specific information needs which might appear in the overall typological assessment

As this study has proceeded various other ancillary questions have arisen for further consideration Much more attention has also been given to the informal change agencies and future oriented movements which are not so integrally identified within futures research as presently conducted These areas will be more fully documented in a series of appendices in the end report on the U S Study i e as covering aspects of life style change agents communes the youth movements etc

The *first phase report* on this typological study of futures research in the United States was completed in June 1970 This has now been forwarded to the sponsoring agency i e the U S National Institute of Mental Health and is now available for wider distribution *

**The International Survey Study**

*The second phase* of the study will conduct a similar typological analysis of futures research and long range forecasting activities in the various world regions It will be conducted in collaboration with a number of the major futures research centers in Western and Eastern Europe Asia and Latin America The initial organisational steps in this survey are already underway and this major activity will be formally inaugurated at the Second International Future Research Conference in Kyoto

FUTURES Journal England will also cooperate in this international survey and has published the guide/questionnaire for this purpose in one of that issues The journal has also provided offprints of this for use at the Kyoto Conference

*Copies may be obtained from (at $2 00 per copy)
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and for further circulation to other individuals and centers in various countries Additional information may be obtained from Dr John McHale during the Conference After please direct inquiries to

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# NOTES ON INFORMATION AND EPISTEMOLOGY IN FUTURISTICS I TOWARDS A CONSENSUS II PROPOSALS FOR AN INTERNATIONAL COMPUTERIZED BIBLIOGRAPHY IN FUTURISTICS

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*A wise god covers with the darkness*
*of night the issues of the future*
*Horace Od III 29*

The objective of this paper is three fold

1) to demonstrate a close relation between the information problem in futuristics and the epistemological structure of the field
2) to report on results from an experiment in generating a computerized bibliography for futuristics and
3) to suggest a procedure intended simultaneously to enhance the scientific development of futuristics and to produce agreement on an international project for computerized services for the community of futurists

## I TOWARDS A CONSENSUS

### 1 a Futuristics and the structure of science

The metaphor cited from the odes of Horace has a great appeal as a descrip tion of the ambitions of futuristics With some effort a local illumination can be achieved and the range of this effort for a meaningful endeavour is related to the topography of the region and its neighbourhood The light of course is information The goal as it could be stated is to identify and analyze all pieces of information directly or indirectly relevant for the temporal development of a specified system Now the relevance of information generally is not evident until the correct questions have been put that is the relevance is related to an hypothe sis The testing of an hypothesis again is done through models or related purged systems where the importance of principal components is open to analysis It should not be a controversial statement that the scientific method for futuristics is not different from that of inquiry through induction and intui

(In accordance with a trend in futuristic literature the word science is possibly used in a sense closer to the Continental than to the Anglo Saxon concept)

tion of any other field (Re 67 Me 69) The futures aspect is in fact part of most areas of knowledge and experience The old philosophical problems of the rela tion of explanation to prediction (Re 58) and the recognition of laws and trends in the interpretation of empirical information are instances in point If one can isolate a system and find a law or a description for its behaviour these same laws or descriptions will serve for a prediction given the initial conditions and exclud ing external interference

Often a complete description cannot be given nor a comprehensive theory be developed because of the level of understanding lack of information available or even the character of the system It may for instance not be reducible to quan tifiable parameters or may defy delimiting within a manageable framework Even in this situation if the problem has been recognized as relevant a system atic compilation of material and a subsequent analysis will be the only way for advancement of knowledge (however incomplete) There are of course limita tions to verifiability in all scientific fields and seen in this context futuristics studies have no particular features which in principle would make them differ from other investigations

Frequently the new element regarded to characterize futuristics is the omni disciplinary or integrative approach cutting through the entire body of knowl edge for the assembly of all relevant information as a basis for conjecture The idea is that by widening the scope outside the range of a conventional discipline structure one could see the system to be studied in a larger context thus improv ing the level of approximation and the relevance of prognostication Further one would open up for investigation areas which were before neglected or over looked

(It might be noted that the metaphoric language used to describe the structure of knowledge (with terms such as *area border research front overlapping branch*) refers to a two dimensional mapping or hierarchy which may represent what might be called locally the relationship of problems and methods but gives a misleading impression of the overall relations Whenever an uninhibited source of information and choice of problems is necessary a three or multidimensional image might be more adequate to represent a diversified structure of information channels This is particularly true as will be apparent later in a case like futuris tics )

Up to this point there is however nothing particularly new in this integrative approach to scientific methodology Citing a comprehensive formulation where the truistic touches the profound The scientific method is a potentiation of common sense exercised with a specially firm determination not to persist in error if any exertion of hand or mind can deliver us from it (Me (69) In this conception the prevalent discipline structure does not have any functional sig nificance (other than for purposes of management) and appears even dys func tional for the goals of scientific growth whenever it sets false barriers to the objectives of research Whereas for most areas of research the elimination of such barriers would appear to represent an ideal state of working conditions for futuristics it might stand out as a *sine qua non* because of the character of the problems posed *The integrative approach though ideally inherent in all scientific method may be essential for progress in futuristics Typically broadly conceived programs will then be split into workable sub projects not necessarily fitting into the pattern of established disciplines*



### I b On consensus

Recent studies of scientific growth have demonstrated interesting basic prin ciples John Ziman (Zi 68) makes the following statement The objective of Science is not just to acquire information nor to utter all non contradictory notions its goal is a consensus of rational opinion over the widest possible field The introduction of terms like hard and soft sciences in the discussion of the structure of science clearly reflects the importance of the problem of con sensus (St 67 Pr 69) In this respect futuristics (seen in the integrative sense) has a particularly difficult position which can be explained by its status in the history of science

On one hand in a simplified description the emergence of a new field of scien tific enquiry a discipline is normally recognized as a focussing of interest on a range of problems related in some way to one or several established areas of research Thus a consensus grows up in a natural way along with the recognition of a new discipline (A more detailed historiography would of course recognize a line of evolution with the focal points shifting as a result of growing knowledge and interaction with other areas (Sc 35))

Futuristics on the other hand is not in a clear cut way resulting from a natural development enhanced by specific problems It is in a way a derivative from the externally imposed conditions of an integrative scope with regard to the specific aspect of prediction applied to a wide range of questions Con sensus therefore would be almost equivalent to the formation of a general unity of science (This may at present seem to be a utopy though progress in the context of futuristics could act as an important incentive towards its realiza tion )

The question is of course whether the system of futuristics will by its own momentum tend to the necessary formation of a consensus As noted above postulating an integrative approach for the solution of problems defined for futuristics the projects will in practice be organized as clusters of sub projects not necessarily fitting into established areas of research and held together by some agent for co ordination ensuring compatibility between different parts The non conformity to the disciplinary structure will have the effect of defining for each sub project a particular projection of the total space of enquiry A limited neighborhood of the part central to the problem will inevitably dominate and the outer parts will be distorted or neglected This is somewhat similar to the discipline structure only that each problem defines its own limits and range

With the experience from efforts to establish some sort of scientific unity in limited areas well within the limits of established fields in an advanced stage of development the situation referred to would appear as extremely unstable The conclusion must be that *although the necessary prerequisites for scientific futuristics manifestly include delimiting consensus and cumulative growth no convergence towards such a state can be expected on a macroscopic scale without deliberate efforts* Now this leads us to the third aspect that of the status of futuristics in relation to the growth of scientific systems in general

### I c Science and Non Science

No man is an island said John Donne and the same is true of all sorts of human efforts Even if there is no such a thing as a complete unity of science (at least in the form it takes today) within which new knowledge would simply act as pieces of a Chinese puzzle fitting in all directions different areas of science do not behave as isolated systems Their development is controlled by interac tions with other areas of research and constraints imposed by the system of society in which they are embedded This gives rise to a more or less consistent axiology with political components An extreme formulation of a principle of assessment has been given by Alvin Weinberg who states that the scientific merit of a field of science is to be measured by the degree to which it illuminates and contributes to the neighbouring scientific disciplines (We 63) If relevance is measured in this way the problem of consensus gets a new dimension It appears that the requirement of consensus on a basic framework is related not only to the fundamental principle of cumulative growth (e g Pr 69) and a func tional delimiting of the field It is also a prerequisite for a branch of science to survive in its wider context in the evolution of science

The political component originates from the responsibility of financing research the increasing influence of science on society and from the recognition that the social system of science like the cognitive (intellectual) system does not form a unity As Weinberg points out (We 70) the system of control evalua tion and recognition developed along with the consensus in each field the intellectual marketplace works well only on the microscopic scale Politics must be an essential element in setting the big priorities in science The assess ment of value must in a sense be put on an equal footing with the questions of knowledge and truth in spite of the fact that it escapes the realm of pos sible consensus

If men define situations as real they are real in their consequences This striking formulation of the principle of the *self fulfilling prophecy* (Me 48) or the *Oedipus effect* (Po 57) illuminates the fact that in the area of futuristics it is hard to draw a line between prognostication and planning Therefore *whereas for most sciences the political aspect acts as a constraint for futuristics it is also a basic component* (With this interpretation futuristics represents what might be called a neo Baconian view of socio technological engineering This would mean an emphasis on the utilitarian view of the function of science The attainment of social goals is related to the development of science which acts as a necessary overhead activity in society (We 70) through the incremental accumulation of knowledge the sustained social interaction between men of science and the methodical uses of procedures in inquiry (Me 61)) *Irrespective of the rigour eventually attainable* in the so called soft sciences *and the degree of consensus reached* within the unifying approach of futuristics *the dichotomy remains of a scientific and a non scientific part* (without any pejorative connotations (Pr 69 Zi 68))

I would suggest that this is the most important characteristic of futuristics seen as an area of scientific investigation and that it might be both essential and non evident that this feature is made clear in the course of work and in the presentation of results In this way much of the basis for criticism of the philo sophical foundations of futuristics might be reduced to problems of interpreta



tion of the significance of results In some respects there is as well a parallel as an anti parallel in the relations of futuristics and history The feasible role of (historical) interpretation does offer the full prospect of understanding but without the fringe benefits of prediction or of law like explanation (Wa 68)

### I d The information problem in futuristics

In his classic study *The Poverty of Historicism* (Po 57) Karl Popper makes the assertion developed elsewhere We cannot predict by rational or scientific methods the future growth of our scientific knowledge We cannot therefore predict the future course of human history This has rather important implica tions for the problem of information in futuristics Leaving aside the somewhat academic question whether the totality of information is infinite (where the concept of information must be defined with some rigour ) one can agree that it is anyway so large that it cannot be recorded stored and processed (He 66) This however means that discussions on universal data banks in reality refer to collections of information selected according to some unspecified principle apparently leaving all specifications of possible objectives open This is also the case where general limitations are given e g all information relevant for the development of international politics

For a practicable system whatever principle one tries to formulate for the selection of data it must be related to questions that can be formulated from the present state of knowledge or deduceable from it without introducing new information Now if it were possible to construct and maintain a general data bank in the sense under discussion this would imply the possibility of formulat ing all relevant questions and this is not very far from actually predicting the growth of knowledge which is impossible according to the assertions cited above It would seem a plausible corollary that *there is no such thing as a universal structure in the space of knowledge Each problem defines its own subspace of information which requires its own projections stratifications and connections*

All this may seem trivial but it is not without importance in the formulation of goals for a realistic program on data banks for studies in futuristics Data systems have to be conceived working for the present state of knowledge with functional flexibility guided by reasonable prognostications and estimates of costs If this point is not considered projects may end as failures which could have been avoided with little effort on the planning stage What should and can be done is of course to design and develop systems so that files which are related logically by their information contents should also be compatible form ally This requirement implies a high degree of national and international co operation and standardization the results of which are by no means restricted to studies in futuristics

## II PROPOSALS FOR AN INTERNATIONAL COMPUTERIZED BIBLIOGRAPHY IN FUTURISTICS

### II a Problems in bibliographic structuring of nascent fields

A natural starting point for work towards delimiting the field and a con sensus on principles and concepts as a basis for cumulative growth indicated in

the previous discussion is a study of the literature presenting itself as futuristics Apart from this approach to fundamental problems the unrestricted access to the literature is as necessary a prerequisite for continued work in this field as in any other The growing interest in all areas for the possibility of more consistent prognostications already shows up as a host of contributions adequately described by the worn expression of an information explosion The solution to the most urgent information problem is of course to be found in the application of computer methods to the production of a cumulative bibliography which can be used for automatic retrieval and production of all sorts of printed catalogues This relatively simple project should then be followed by other international systems for information exchange and information services

In designing a system adequate for the handling of bibliographic information one has to consider the relevant features of the field For the retrieval of information one needs subject oriented (systematic) channels along with the evident alphabetic organisation On the other hand if the integrative approach were really characteristic of futuristics the true contributions would not fit into any conceivable classification scheme since a disciplinary structure is the antithesis of the integrative view of a unified science

In reality this is however not the case Except for fiction general essays and meta futuristics the contributions are readily subject bound However each domain of problems generates its own information structure and even if in each case a limited number of areas of enquiry dominate there is no universally applicable scheme that reproduces all relevant features of possible studies in futuristics This is a microscopic view of the classification problem From a macroscopic point one can always reach a compromise yielding an acceptable reasonably coarse network which has to be made flexible enough to allow for modifications as the subject grows and develops its paradigms in the sense of T Kuhn (Ku 62)

When one tries to squeeze one subject into a scheme generated for a different purpose the effect will be a clustering of items into a number of sub fields with more or less adequate attributes and the exclusion of items that do not fit into the spaces available A criterium for an efficient classification scheme on the other hand must be a relatively isotropic distribution in the bibliographic mapping Therefore normally one has to expect the need for a system of classification tailored for its particular use

It may be worth while looking at the solution chosen for the RAND abstracts covering a field of studies with problems analogous to those of futuristics Three lists are automatically produced from the basic input 1° all abstracts sorted according to report number 2 an alphabetic author list presenting abbreviated (one line) titles and the corresponding report number and finally 3 a key word index corresponding to a manual classification according to a scheme of descriptors With this procedure one avoids binding up the field in a rigorous systematic hierarchy However even limiting one's interests to a restricted sub field one has to scan through the entire list of key words in search for relevant documents Further as the system grows and new descriptors are introduced one inevitably arrives at inconsistencies in classification which contribute to the lack of consensus on terminology and concepts

Another system of particular interest in the present context is that developed



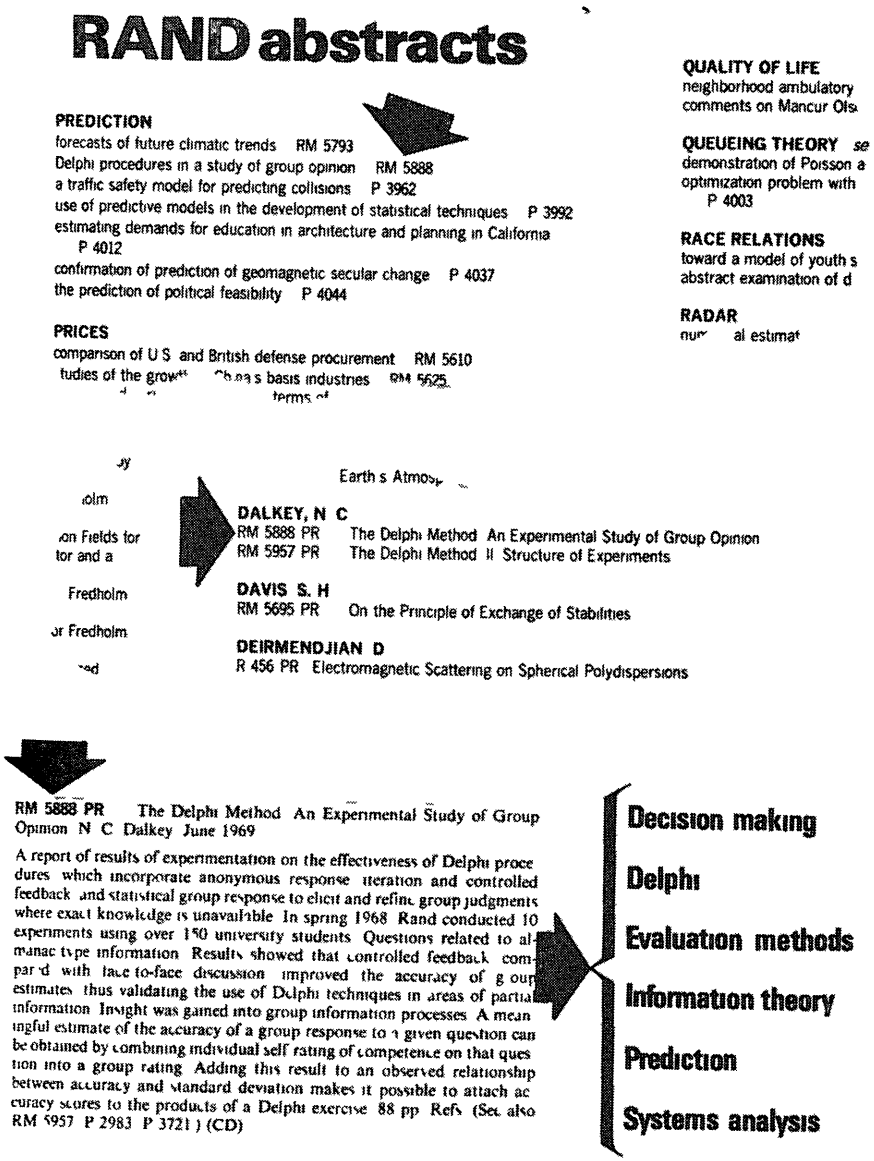


Fig 1 The structure of RAND abstracts The main entry consists of bibliographic information abstract and key words From this three types of listing are produced automatically i e Key word index to reports author index and main list with abstracts in sequential (report number) order

for the abstracts of the US Government R & D Reports A set of twenty two fields has been defined each divided into a number of subfields A further classification is given by added descriptors Items consist of bibliographic information and a complete abstract Items pertinent to different areas in the scheme are repeated under the corresponding headings This organization is useful for a rapid survey of particular fields but it also allows for computerized retrieval on complex searching profiles

**II b On the information structure in futuristics**

In the present formative stage of development it would obviously be dys functional to use a fixed bibliographical structure as framework for the literature in futuristics However a study of the documents indicates that six principal fields can be defined roughly by the following headings

I *Futuristics* (general)
II *Natural Sciences and Medicine*
III *Applied Sciences Technological Sciences and Engineering*
IV *Political and Policy Sciences*
V *Other Behavioural and Social Sciences Social Welfare*
VI *Humanistic Sciences*

It is obvious from the discussion that no representation can yield a separation into disjoint areas i e so that a document would fit uniquely into one place The main fields are logically interconnected in a complex way and any single project could carry aspects pertaining to any combination of fields

Consequently the classification directly reflects the cognitive structure of the problems investigated Thus in the same way as sciences in general and the omni disciplinary science of futuristics in particular do not fit into a two dimensional hierarchical system such a structure is not adequate for a bibliographic mapping of the corresponding literature On the other hand with the scheme of six principal fields suggested a three dimensional representation of the information couplings is easily visualized (To this end field I should be thought of as the centre of a regular tetrahedron fields IV and V should be fitted in one corner and fields II III and VI in the remaining ones All corners should be thought of as connected with each other and with the centre)

Details of a tentative classification scheme developed and used for the experi ment presented (see Appendix) are given in section II c A simple decimal classifi cation is used to split the principal fields into a number of areas and sub areas at present a total of seventy

In the experiment the records have been reduced to contain only elementary bibliographic information such as author title of publication journal (title and editor for corporate volumes) year and place of publication etc This could of course be extended to include an abstract and even different kinds of an notations as well as references to other related publications Such comments which might considerably increase the usefulness of a bibliography can easily be kept up to date by the normal procedure of file management

In a more advanced stage where the system would be thought of as the basis for a regular publication it would be of great advantage if authors might them selves indicate the type of classification they find most adequate and supply further auxiliary information In several scientific journals a kind of very formal



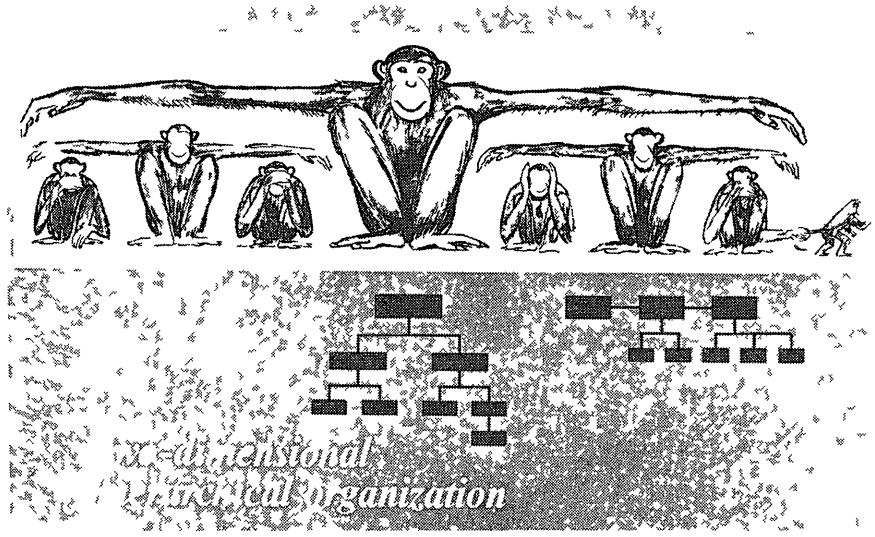


Fig 2 Most areas of research do not fit into a two dimensional hierarchical system Such systems for convenience of handling have to be simplified sacri ficing depth of indexing which results in a still more distorted model of the real cognitive structure

ized abstract is already stipulated as a condition for publication and this seems all the more reasonable since the author should be expected to be the person most competent to sort out the principal points of his work

A detailed content analysis of the futuristics literature indicates that the dichotomy of science and non science discussed in section I c calls for the inclusion of a particular type of bibliographic information indicating the char acter of the publication In the present experiment an asterisk (*) has been introduced for non technical articles that might be read and appreciated without any particular knowledge or experience of the field Along the same lines it would be readily possible for the author to indicate the main ambitions and the expected audience of the paper Is it an analytical review article an essay exposing new ideas in a general way a report from an advanced scientific program a polemic contribution to a policy debate etc? Is the reader expected to be a politician a specialist in a particular field or an intelligent layman? All of the above types of writings have their legitimate raison d etre in their right context and they all contribute in a complex way to an eventual formation of consensus and to the cumulative growth of knowledge However to the reader looking for particular types of information some declaration of the sort indicated in the bibliography might be immensely useful

It might also eliminate much of the misunderstanding and scepticism often meeting a new field of endeavour At present probably to a large extent due to

the dichotomy noted no one feels free to apply his own standards of excellence to the evaluation of work There obtains a situation of complete liberty char acterized by the words of Fyodor Karamasov everything is permitted (Do 80) a many sided challenge for a new science the effects of which hardly can escape observation New conventions for presentation will of course eventually develop and it is not unlikely that a bibliography with the ambitions outlined could even contribute to this process

### II c A tentative classification scheme for futuristics

**I Futuristics (general)**
I 1 1 *General Aspects on Studies of the Future*
I 1 2 *Essays with General Scope*
I 1 3 *Particular Sectors with General Implications*
I 2 1 *Intuitive Forecasting* (methods principles and general applications) incl Delphi technique
I 2 2 *Explorative Forecasting* (methods principles and general applications) incl scenarios extrapolations
I 2 3 *Normative Forecasting* (methods principles and general applications)
I 3 0 *Periodicals*
I 4 0 *Bibliographies*

**II Natural Sciences and Medicine**
II 0 *General Studies* incl natural sciences and medicine and their impact on other fields
II 1 *Mathematics* (pure and applied) incl numeric methods systems research statistical methods and processes etc
II 2 *Physics* incl astronomy astrophysics etc
II 3 *Chemistry* (theoretical inorganic organic) incl crystallography miner alogy etc
II 4 *Geology and Geography* incl meteorology geophysics oceanography etc
II 5 *Biology* incl genetics microbiology etc
II 6 *Medicine Pharmacology*

**III Applied Sciences, Technological Sciences and Engineering**
III 0 0 *Technology* (general)
III 0 1 *Technological Growth* incl relations of technology to science tech nology transfer
III 0 2 *Organization of Technology* incl organization of R & D systems studies technological gaps information
III 0 3 *Technology and Society* incl impact of technology on other areas
III 1 0 *Technological Forecasting* (principles and general applications incl experience of past forecasts
III 1 1 *Intuitive Forecasting* (principles and general technological applications) incl Delphi technique
III 1 2 *Explorative Forecasting* (principles and general technological appli cations) incl scenarios extrapolations



III 1 3 *Normative Forecasting* (principles and general technological applica tions)
III 2 0 *Computer Technology* (general applications) incl software systems programs languages
III 2 1 *Administrative Data Handling*
III 2 2 *Scientific Technologic Data Handling*
III 3 0 *Mechanical Engineering*
III 4 0 *Electric and Electronic Engineering* incl power sources technology of information computer hardware
III 5 0 *Material Resources* incl geological resources mining processes of mineral purification forestry
III 6 0 *Chemical Technology* incl organic and inorganic materials fuels pharmaceutics
III 7 0 *Nutrition* incl agriculture stockbreeding fishing synthetic nutriments
III 8 0 *Public Health Engineering* incl water supply sewage pollution sanita tion illumination heating
III 9 0 *Civil Engineering* transport engineering building

**IV Political and Policy Sciences**
IV 0 0 *General Studies Methods and Principles*
IV 1 0 *Politics and Policy (general)* incl political structures and processes ideologies
IV 1 1 *Politics and Policy (public sector)* incl national and regional policies for social welfare science policy
IV 1 2 *Politics and Policy (private sector)* incl industrial investment policies etc
IV 1 3 *Politics and Policy (international sector)* incl international system peace research etc
IV 2 0 *Administration and Management (general)* incl theory and methods of public and business administration
IV 2 1 *Administration and Management (public sector)*
IV 2 2 *Administration and Management (private sector)*
IV 2 3 *Administration and Management (international sector)*
IV 3 0 *Economy (general)* incl economic theory
IV 3 1 *Economy (public sector)*
IV 3 2 *Economy (private sector)*
IV 3 3 *Economy (international sector)*
IV 4 0 *Law*

**V Other Behavioural and Social Sciences, Social Welfare**
V 0 0 *General Studies Methods and Principles*
V 1 1 *Psychology (individual)*
V 1 2 *Psychology (social)* incl values and norms
V 2 0 *Sociology* incl social relations structures and processes organization theory
V 3 0 *Statistics (applied)* incl demography labour market etc
V 4 0 *Social Welfare System (general)* incl social organization
V 4 1 *Health Care* incl hospitals medical care safety drugs

V 4 2 *Education and Research* incl schools universities learning research process training mass media
V 4 3 *Welfare* incl social security insurance urban problems poverty minority groups race relations
V 5 0 *Anthropology and Ethnography*
V 6 0 *Physical Planning* incl cities regional planning environment transportation leisure

**VI Humanistic Sciences**
VI 0 0 *General*
VI 1 1 *Philosophy of Science Epistemology Semantics*
VI 1 2 *Other Areas of Philosophy*
VI 1 3 *Religion*
VI 2 0 *Linguistics and Literature*
VI 3 0 *Fiction*
VI 4 0 *Arts* incl music
VI 5 0 *History* incl antiquities history of civilization history of ideas etc

### II d A brief description of the ABACUS system adapted for a bibliography in futuristics

The system selected for the proposals presented has been given the acronym ABACUS (AB Atomenergi Computerized User Oriented Services) It was developed at the Royal Institute of Technology Stockholm and the Atomic Energy Company Studsvik (Te 68) The program system was designed for great adaptability to different purposes in automatized documentation It is at present in the process of modernization *inter alia* to accept MARC II compatible records This will make possible an extended interchangeability of bibliographic information since the MARC II format is expected to be accepted as an international standard

For input to the system new entries including classification codes are punched on paper tape The initial sorting is done by computer according to the scheme introduced (cf section II c) and the material is subsequently merged to the main file Different kinds of particular lists can then be produced by computer processing The file can also be used for automatic retrieval of information

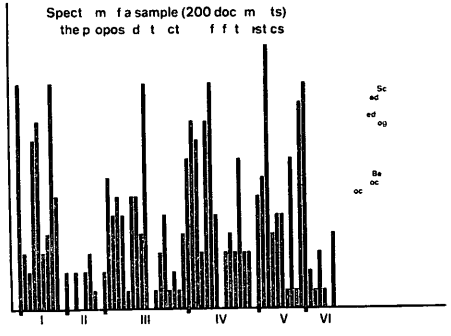


Fig 3 Spectrum of a sample (200 documents) in the proposed structure or futuristics The diagram represents the distribution in the fields and subfields resulting from multiple classification (multidimensional bibliographic mapping)



The printout of the principal list is arranged in two columns the entries following their corresponding headings Within each group the items with a serial number allocated for reference are arranged alphabetically by author

The author list presents all authors names along with the reference numbers of all their publications listed Multiple indexed papers give rise to a reference number for each indexing The representation could of course be changed to list the first line of the document titles as is done in the RAND bibliography

The KWOT index (Key Word Out of Text) is a permutation index where the key words have been extracted as headings for the corresponding group of first title lines with reference numbers of documents All words of a title are permuted except those appearing in a list of excluded words In the present experiment particular words in French and German were introduced in the stop list to produce reasonable indexes With the present programs multiple indexing gives rise to multiple lines in the KWOT index but this could be changed by suppressing repeated lines with or without leaving the corresponding multiple indexing reference numbers

Generally speaking the material presented in the appendix should only be interpreted as a demonstration of how the tentative classification scheme works and of one particular way of using the ABACUS system for file management and for automatized list production

## CONCLUSIONS AND RECOMMENDATIONS

To sum up my arguments I would suggest that futuristics needs a deliberate effort to make up for its somewhat uncontrolled genesis and adolescence This does not imply that the field should be forced into a rigid structure which would inhibit a sound development along as yet not identifiable lines

As a science grows to maturity as already pointed out by Poincare the interest for questions of methodology have to give way to the formulation of relevant problems and their solutions To achieve this what one needs is a situation where the criteria for scientific inquiry are satisfied as to a relative consensus on fundamental concepts and principles A continuous discussion and analysis of the foundations of futuristics will yield (almost as a by product) a workable delimiting of the field and a basis for cumulative research as well as standards for evaluating new contributions The lack of a traditional epistemology should be compensated by a current awareness of the limits of the scientific and non scientific components which form essential parts in futuristics

This current awareness of the unfolding of the structure of futuristics would perhaps be most efficiently sustained if it could be institutionalized in the form of an international committee This committee should have the functions

- to review the coherence of ideas and issue recommendations for standardization of concepts and principles
- to suggest investigations in areas lacking consensus
- to initiate research in areas that appear to be underrepresented
- to sponsor and coordinate experiments and working systems for international information exchange and information services

A first goal might be an agreement on the form and development of an

ABACUS for Futuristics

Principal Bibliographic List

Helmer O
Simulating the Values of the Future
New York 1969
Values and the Future Eds K Baier and N Rescher
pp 193 214

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Author Index



KWOT Index

FUTURE



SIMULATING



VALUES

**Fig 4** The ABACUS system adapted for futuristics The *principal list* gives bibliographic information (abstracts can be added) in the hierarchical scheme proposed with possibility for multiple indexing The *author index* is produced automatically and gives reference to all locations in the principal index The *KWOT* (Key Word Out of Text) *Index* gives the first line of each entry where a given word appears somewhere in the title



international computerized bibliography based on a convenient system of national or personal contributions

I would like to conclude with an idea related to that opening this discussion A systematic analysis of the documents forming the body of futuristics inevitably leads to the important epistemological problems of the field and thus is a powerful instrument for advancement towards a consensus

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36

# THE STUDY OF SCIENCE FICTION AS A FORECASTING METHODOLOGY

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Major interest in the elaboration of forecasting methodologies appears to be focused at the present time on techniques that emphasize the manipulation of relatively hard quantifiable data by the forecaster in his attempt to devise a given scenario such techniques include trend curve analysis cross impact matrix analysis value weighted relevance trees computer simulation and Delphology It seems valuable to supplement these methods with investigations of whatever data might be obtained from more qualitative or sociological sources not only because the exclusive manipulation of quantifiable data may lead one to overlook important realms of human behavior but because even the more ostensively objective methods of forecasting usually start with the subjective opinions of informed observers

Of the supplementary sources of forecast material the study of science fiction should hold major interest for futurologists since it is the only branch of literature that has consistently and self consciously taken for its purview the spinning out of alternative futures for mankind with particular attention to the roles in society of science technology and the scientist Indeed both science fiction and futurology share the root assumptions that man does have *alternative* futures open to him and that it is worthwhile to explore these in some detail for the possible edification of present policy makers and the informed public Thus I believe that science fiction has a presumptive utility for futurology both in itself as a stimulus to creative thinking about possible futures and as a feeder source whose data may be correlated with data and concepts monitored from other sources of predictive trends

As yet however there exists no definite methodology available to the futurologist in making use of science fiction For that matter the whole relevance

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of literature or the arts in general for technological and social forecasting has only begun to be studied Therefore here I can only outline in a modest way some of the possible kinds of data that science fiction might provide the interested futurologist

In its role as data source for futurology science fiction has two aspects It is itself an agent that affects society and so may be studied as one of the contempo rary social forces that help shape the future and more directly it is a literary form that uses as a major plot theme predictions of future technology and of the social consequences of future science and technology

## SCIENCE FICTION AS SOCIAL FORCE

Science fiction may be treated as not merely an entertainment medium but as a social force in its own right that has perceptible influence on the society within which it operates even if this influence is not yet amenable to quantitative meas urement Thus futurologists may wish to monitor science fiction as they would other social agents of influence such as the electronic media or political move ments

One general aspect of science fiction here is as promoter of the self fulfilling or self negating prophecy This takes several forms First science fiction as a historical fact has apparently acted as a stimulus to the development of several of the major inventions of modern times some of the gadgetry in early science fiction stories inspired readers to go ahead and perfect the devices described when they had the requisite skills and resources Surely the major example of this phenomenon is Jules Verne whose tales of submarines and rocket ships were later given credit by such developers of these technologies as the American submarine builder Hall and rocket pioneers Tsiolkovsky Von Braun and God dard for inspiring their work That this inspiration function is still at work can be seen in a recent account by John R Pierce describing his work in communica tions satellites in which the author recalls his early reading of the series of stories by George O Smith dealing with the problems of interplanetary communica tions (*The beginnings of satellite communications* San Francisco Press 1968) It may be of particular interest for futurologists to monitor stories written by scientists themselves under the working assumption that some of the latter may include in their fiction descriptions of future gadgetry whose imminent appear ance the scientist authors have a feel for due to their knowledge of work going on in the given field

Second science fiction has not only influenced the development of particular machines but has positively oriented the career expectations of many of its young readers toward science and engineering If it is true that individuals with such expertise will be major sources of influence on the direction of the future then it is important to study as part of the sociology of science just what set of attitudes toward their fields and public policy potential scientists and technolog ists pick up from their childhood reading of science fiction

Third science fiction may serve as one source of public polity guidelines for present decision makers or more generally may contribute to the broad cultural assumptions of the society within which these people operate Here science



fiction performs a function similar to that of its non fiction twin the scenario in presenting a series of potential alternative futures of which some may be more desirable in terms of present values than others If it is true that the image a society has of the future influences its organizational activities in the present then science fiction in general and utopian and dystopian literature in particular may have had a more important long range influence on Western society than has been realized For instance one pervasive theme among the many possible futures simulated in science fiction has been the self alienation and environ mental destruction that man risks in perfecting technologies over which he has less and less control now that post World War II science and technology do indeed threaten man s continuing psychic and physical viability it may be that the literary warning provides the ideological underpinning at least in this coun try [USA] for the debate going on in public agencies and many private institutions over how technological innovations might be managed in the public good A more specific example of this phenomenon has been provided by I F Clarke in his analysis of the impact on British political and military planning at the turn of the century of a rash of stories appearing in the late 19th century describing the potential effect on Britain of then future developments in naval and aerial warfare (*Voices prophesying war 1763–1984* Oxford 1967) Even as the findings of futurology itself become more widely publicized and diffused science fiction will probably continue to provide for some time to come the predominant visions of possible futures most conveniently accessible to both the mass public and important decision makers in a format more engaging emotionally than many non fiction scenarios The research role of the futurologist here then is to inventory the recurring alternative futures appearing in science fiction themes and to trace their contributions to both social ideologies and particular public policies Work in this direction has been undertaken by such men as Frederick L Polak (*The image of the future* 2 vols Oceana 1961) and W H G Armytage (*Yesterday s tomorrows* Toronto 1968)

Apart from its role as generator of self fulfilling or self negating prophecies science fiction is also a social force insofar as it serves as preparatory medicine for men in a world of accelerating socio technic change That is science fiction may be an innoculator against future shock It seems that the human mind is not indefinitely capable of withstanding the strain of continuing environmental change Ironically the same science fiction which contributes to this pace of change by stimulating technological developments at the same time may innure its readers against social disruptions caused should these developments be realized by building an air of familiarity among readers with them While I know of no hard data now available to establish the point it seems to me that regular readers of science fiction and to lesser degree the general public exposed to science fiction themes that work their way into the popular culture engage in an initiation rite a psychological preparation for an era of swift change in their exposure to the literature This is not to say that such readers have any less sense of wonder when the foreseen events come to pass but that at least some sense that future possibilities in science and technology (including social science) are knowable and can be prepared for is engendered Thus science fiction fans have long been used to the idea of space travel and human colonies on other planets and have been reading for some time about the consequences of such develop

ments as genetic engineering intelligent machines and contact with intelligent extra terrestrial life

## SCIENCE FICTION AS PREDICTOR OF CHANGE

Besides analyzing science fiction as one of the influences that stimulate and inhibit social and technological change futurologists can use this literature to assist them more directly in gathering and correlating forecasts Science fiction is both an implicit and explicit source of predictions

By implicit source I mean that science fiction and its creators as in any other art form can be examined from sociological and psychological perspectives to see what searchlight may be thrown on contemporary social trends by the kinds of issues taken up in plots and how they are dealt with The working hypothesis is that a systematic monitoring of science fiction would reveal recurring themes characters and their roles and basic assumptions illustrative of important trends in social behavior and technological development occurring within the society of the authors Science fiction may well be an early warning system about issues that are working their way into the public consciousness one example of which noted earlier is the literature s continuing concern with the dehumaniza tion of social life resulting from the technolicization of modern society Similarly we have been getting in recent years stories dealing with the political moral and legal implications of man machine conbinations ( cyborgs ) genetic engineering and control of behavior by electrical stimulation of the brain Analysis of this sort has been carried out by Robert Plank in a fascinating book on the use of alien entities in science fiction UFO and supernatural literature (*The emotional significance of imaginary beings* Thomas 1968) and by Mark R Hillegas in a study of H G Wells and the anti utopian tradition (*The future as nightmare* Oxford 1967)

It is probably as an explicit source of predictions that science fiction is best known to both futurologists and the general public although the track record of the field here is not as clear or positive as one might think As a simple typology science fiction predictions may be classified in three headings Anticipations of future scientific discoveries and technological applications of future discoveries and applications in the social and behavioral sciences and of the social conse quences of developments in the first two categories Examples of the first kind of prediction would be the various pre World War I stories containing adventures with weapons as tanks airplanes submarines and even devices of mass destruc tion Social science predictions are rarer but may be found in such stories as Asimov s *Foundation* trilogy (a science of psycho history is developed whereby the broad activities of very large masses can be predicted via mathematical formula) and Brian W Aldiss Total environment (*Galaxy Magazine* 1968) Sociological prediction—accounts of future social roles and functions—may be found in such recent novels as Anthon Burgess *The wanting seed* (Ballantine 1964) (describes drastic methods of population control) Frank Herbert s *Dune* (Ace 1965) (correlates societal forms with planetary ecology) and John Brun ner s *The jagged orbit* (Ace 1969) (extrapolates the Kerner Commission s warn ings on U S race relations)



The primary uses of such predictions for the futurologist will likely be their stimulus to his own imagination and their serving as possible correlates with predictions gathered from other sources However the quality of the predictions is a serious issue My impression is that contrary to its reputation science fiction *as a whole* has been only randomly successful in its scientific and technological forecasts and usually unconcerned or too conservative about social forecasts Much of science fiction consists of variations around a standard plot in which an earthman sometimes with a little help from his friends overcomes great odds by displaying brilliant technological prowess and great physical courage in order to save his planet or rescue his girlfriend (the priorities aren t always clear) the characters in such stories human and otherwise are placed in situations and react in ways familiar to 20th century Anglo American man

Fortunately in a trend that is itself very interesting since World War II there has appeared an increasing number of quality stories focused on the social science and sociological types of predictions in which the author explicitly assumes that future social structures (family government religion) need not be exactly the same as those of the present or that forces which presently motivate men (desire for wealth territoriality) need not continue unchanged In evaluating the utility of these stories for his own use the futurologist should take into account such factors as the internal consistency of the plot the explicitness and logic of the extrapolation and the general reputation of the author

It is clear from this that an imperative research need could be fulfilled by a systematic analysis of the literature with the goal of developing more definite principles if possible about why some science fiction forecasts over the last century may have been more successful than others and whether the degree of accuracy can be traced to patterned correlations There may well exist cultural factors that help explain why individuals either consistently miss or consistently succeed in identifying the most probable futures of their society any findings of such factors and their operation would obviously be of great significance beyond the field of academic science fiction In the meantime futurologists unfamiliar with science fiction and wishing to see what s available could do much worse than dipping into the works of authors of established reputation—well known writers as Arthur Clarke Isaac Asimov Robert Heinlein and Poul Anderson or the younger new wave men as John Brunner Samuel Delaney and Roger Zelazny

**Additional Recommended Reading (Non Fiction)**

Advent Staff ed *The science fiction novel* imagination and social criticism Advent 1964

Amis Kingsley *New maps of hell* a survey of science fiction Gollanez 1961

Asimov Isaac The sword of Achilles 19 *Bulletin of the Atomic Scientists* 17–18 (11/63)

Asimov Isaac Future? tense! *The Magazine of Fantasy and Science Fiction* 100–109 (6/65)

Eshbach Lloyd Arthur ed *Of worlds beyond* the science of science fiction writing Advent 1964

Hirsch Walter The image of the scientist in science fiction a content analysis 63 *American Journal of Sociology* 506–512 (3/58)
Kelly R Gordon Ideology in some modern science fiction novels 2 *Journal of Popular Culture* 211–227 (Fall/68)
Knight Damon *In search of wonder* Advent 1967
Livingston Dennis Science fiction and futurology some observations at a science fiction convention 2 *The Futurist* 47–48 (6/68)
Livingston Dennis Science fiction as a source of forecast material 1 *Futures* 232–238 (3/69)
Maddison Michael The case against tomorrow 36 *The Political Quarterly* 214–227 (4–6/65)
Moskowitz Sam *Explorers of the infinite* shapers of science fiction World 1963
Moskowitz Sam *Seekers of tomorrow* masters of modern science fiction World 1966
Plank Robert Names and roles of characters in science fiction 9 *Names* 151–159 (9/61)
Plank Robert Science fiction 30 *The American Journal of Orthopsychiatry* 799–810 (10/60)
Plank Robert Sons and fathers A D 2001 1 *Hartford Studies in Literature* 26–33 (1/69)
Stein G Harry Science fiction is too conservative *Analog* (5/61)
Philmus Robert M *Into the unknown* the evolution of science fiction from Francis Godwin to H G Wells University of California 1970

## NOVELS AND COLLECTIONS

Asimov Isaac *I Robot The Rest of the Robots* (contains novels *The Caves of Steel* and *The Naked Sun*) and *Nightfall and Other Stories* (1969) Doubleday
Heinlein Robert A *The Past through Tomorrow* (novels and stories in future history series) Putnam
Clarke Arthur C *Childhood s End 2001 A Space Odessy The City and the Stars*
Burgess Anthony *The Wanting Seed* (1963) *A Clockwork Orange* (1963)
Pohl Frederik and C M Kornbluth *The Space Merchants* (1953)
Bester Alfred *The Demolished Man The Stars My Destination*
Zelazny Roger *The Dream Master* (1965) *This Immortal* (1966)
Brunner John *Jagged Orbit Stand on Zanzibar* (Ballantine 1969)
Delany Samuel R *Babel–17* (1966) *The Einstein Intersection* (1967)
Miller Walter M Jr *A Canticle for Leibowitz* (1959) Bantam
Simak Clifford D *City*
Herbert Frank *Destination Void* (1966) *The Dragon in the Sea Dune*
(note also the series of Ace Science Fiction Special novels)

## THEME ANTHOLOGIES

Stover Leon E and Harry Harrison *Apeman Spaceman Anthropological Science Fiction* Doubleday 1968
Conklin Groff and Noah D Fabricant *Great Science Fiction about Doctors* Collier 1963
Keyes Noel *Contact* Paperback Library 1963
Elder Joseph *The Farthest Reaches* Trident 1968 (original stories)
Clarke Arthur C *Time Probe The Sciences in Science Fiction* Dell 1967
Clement Hal *First Flights to the Moon* Doubleday 1970
Harrison Harry *The Year 2000* ]*An Anthology* Doubleday 1970 (originals)
Wollheim Donald A *Adventures on Other Planets* and *More Adventures on Other Planets* Ace



## ANTHOLOGIES OF "BEST" SCIENCE FICTION

Harrison Harry *Nava* Delacorte annual
Knight Damon *Nebula Award Stories* Doubleday annual
Wollheim Donald A and Terry Carr *World s Best Science Fiction* Ace annual
Merril Judith *The Year s Best S F* Dell annual *SF The Best of the Best* Delacorte 1967
Silverberg Robert *The Science Fiction Hall of Fame* Vol I *The Greatest Science Fiction Stories of all Time* Doubleday 1970
Magazines such as *Analog Galaxy* and *The Magazine of Fantasy and Science Fiction* also publish annual anthologies

## GENERAL ANTHOLOGIES

Moskowitz Sam *Masterpieces of Science Fiction Modern Masterpieces of Science Fiction Science Fiction by Gaslight* World
Ellison Harlan *Dangerous Visions* Doubleday (originals)
Boucher Anthony *A Treasury of Great Science Fiction* 2 vols Doubleday 1959
Harrison Harry *Worlds of Wonder Sixteen Tales of Science Fiction* Doubleday 1969
Knight Damon *100 Years of Science Fiction* and *A Centu y of Science Fiction* Simon and Schuster 1968 and 1962 *A Century of Great Short Science Fiction Novels* Dell 1965
Conklin Groff *17 X Infinity* Dell 1963

Note The above list of material is intended to emphasize works that will aid in social political and technological forecasting thus I have made no attempt to include fantasy or sheer adventure tales though these too may inform us indirectly about general cultural trends This list comes more or less from off the top of my head and is therefore not to be taken in any way as definitive or even representative Have fun

# FUTURISM PRO AND CON

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and
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*Neither in the life of the individual nor in that of mankind is it desirable to know the future*

Jakob Burckhardt

*Nothing has any sense for a man except insofar as it is directed toward the future*

Jose Ortega y Gasset

*An epoch will come when people will disclaim kinship with us as we disclaim kinship with the monkeys*

Kahlil Gibran

The purpose of this note is to help lay the basis for a meaningful dialogue on the intellectual and operational validity of the activity known as futurism We recognize that such a discussion has no definable end but hope that this structuring of the issues will be of value to others in the field The questions we have chosen to raise here are as follows

(1) What are some of the possible intellectual positions of the futurist i e what methods and attitudes can he bring to his work?
(2) What are some of the operational strategies available to the the futurist i e what effect can have on the future?

In answering the first question we must recognize that the futurist deals with possible alternative futures or futuribles rather than with the more directly verifiable material available to the scientist or even the artist For this reason futurism is not always considered as a serious intellectual activity The difference is one of degree rather than kind however since a futurible can be exposed to tests of internal logic intuitive plausibility and eventual conformance to obser vation in the same way as any scientific hypothesis or artistic image On this basis futurism has a philosophic validity similar to that of many other intellectual activities

A more productive view of the intellectual position of the futurist is obtained

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by examining some of the alternatives open to him We shall do this by means of an eight way classification containing the following dimensions (Ref 1)

(1) Method objective or subjective
(2) Orientation toward things or toward people
(3) Attitude optimistic or pessimistic

The polarization between subjective and objective method is one which has been discussed at great length One version is the famous two cultures model of intellectual life articulated by C P Snow and subscribed to by other participants in the debate between science and humanism In the field of futurism this polari zation is partially represented by the one between trend research and value research or more generally between technical predictive devices relying on statistical observation and calculation (including use of computerized mathemat ical models) and the examination of literature art behavior and other clues to present and possible future values of society By and large futurism has refrained from debating the merits of these approaches and instead recognized that a creative synthesis of the two is required

The dimension of orientation (toward things or people) is one which exists in the conventional professions and also in futurism Thing oriented futuribles include impressive lists of gadgets and techniques which are seen as the source of the future social order Examples are hypothetical developments in contracep tion longevity energy sources space travel etc The people oriented futurist is more interested in possible new ways in which man will learn to relate to himself and to his fellow man and tends to regard specific technology as less relevant Again however most futurists recognize the need for a productive blend of the two approaches

The final dimension we have chosen is that of attitude the emotional position of optimism or pessimism Here there appears to be a considerable separation among futurists with the predictors of utopia and of doomsday at the extremes The dimension of attitude unlike those previously cited is also one which seems to separate futurism from more conventional intellectual work In most fields attitude is largely a personal rather than a professional issue In fact a profes sional must almost necessarily be optimistic about the efficacy of his work in order to continue doing it

The complete eight way classification resulting from this analysis is presented below with tentative labels applied to each subset As indicated earlier the value of such a scheme is not in categorizing futurists but rather in pointing up some of the issues the futurist faces in establishing an intellectually meaningful posi tion

The second major question we have chosen to raise is that of the operational significance of futurism in changing the future At one level it would appear that the impact of futurism on the world is minimal The decision makers particularly the political decision makers appear to be moved by forces quite remote from their perception of any long term futurible images Likewise decision making power does not appear to be flowing toward the professional futurist to any considerable degree This fact results partly from his disinterest in power per se and partly from the reluctance of the established elite to grant power When sufficiently broadly defined however futurism can be considered to have an enormous influence on the future It is merely necessary to recognize that most



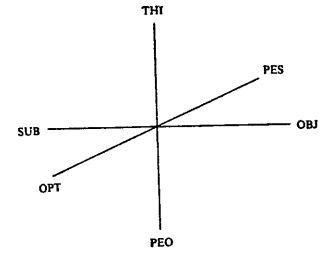


Fig 1 The Space of Method Orientation and Attitude

| METHOD | ORIENTATION | ATTITUDE | FUNCTION |
|---|---|---|---|
| OBJ | THI | OPT | Engineer |
| OBJ | THI | PES | Stoic |
| OBJ | PEO | OPT | Psychiatrist |
| OBJ | PEO | PES | Cynic |
| SUB | THI | OPT | Mystic |
| SUB | THI | PES | Prophet |
| SUB | PEO | OPT | Healer |
| SUB | PEO | PES | Paranoid |

Fig 2 Functional Table for the Individual

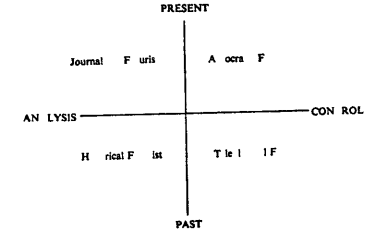


Fig 3 The space of motivation and time reference

governmental officials business executives communications media creative workers etc are futurists since they in fact do predict the future in formulat ing their decisions

As far as the profession of futurism itself is concerned a second classification scheme which may be helpful in sorting out these issues is as follows

(1) Time reference past or present
(2) Motivation analysis or control

The labels of the four quadrants on the following diagram of this scheme are suggestive of some of the possible operational positions of futurism but are clearly not definitive

The primary concern of the historical futurist is with the question Do I understand the past? For him the verification that an established historical pattern continues is sufficient reward The journalistic futurist asks Do I understand the present? or Will present trends continue? and is similarly disinterested in control The teleological futurist is interested in using the real or imagined past as a cure for the present as in various religious and political utopian or distopian images Hence he seeks a form of control but of a very personal sort Finally the autocratic futurist wants to know Can I implement my values in the future? Such an approach can be adopted by an individual but

is more often a characteristic of large groups of people (such as a nation) mobi lized behind the ideas and enthusiasms of a relatively small group at the top Of the four this is the only style which offers the futurist the hope of having global operational significance in the world and yet its elitist flavor makes it rather unattractive to most futurists Operationally therefore futurists do not have real power and probably would not accept it if offered They do of course have the traditional power of the intellectual—the power of ideas

There is one way in which futurists might avoid the twin dangers of intellectual sterility and frustration in the world of power That is to participate in creation of futuristic societies in the interstices of the present social order In this way they might be able to implement new values generate and use new technologies and hopefully serve as a catalyst for change in the world at large One project of this type now being planned is Arcosanti (from archology or architecture and ecology) a new city to be built in New Mexico U S A by Paolo Soleri and his students (Ref 2) Another is Auroville ( City of Dawn ) near Pondicherry India planned as an international high technology city with a value system based on yoga (Ref 3) An example of a presently existing futuristic society is Synanon Foundation in California U S A (Ref 4) Originally oriented toward the drug addiction problem it has grown over the last twelve years into a remarkable social movement involving several thousand people Its major purpose is educa tion for life and the creation of a new lifestyle A major project at the present time is the construction of Synanon City in Northern California

The proposition is this if futurists are really serious about the future they must help create it rather than merely study it In this spirit I suggest that we devote the remainder of this session to a discussion of real projects in which futurists can actively participate

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2 Soleri Paolo Archology Catalog of Exhibition Corcoran Gallery of Art Wash ington D C April 1970
3 Wilcock John Auroville—The Synthesis of Cybernetics and Yoga The Modern Utopian Vol 4 Issue 2 Spring 1970
4 Endore Guy *Synanon* Doubleday & Co New York 1968

# USE OF THE FUTURE FOR DEVELOPMENT POLICY

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*A long future is a long expectation of the future*
—Augustinus—

## Introductory

Discussion of the future in recent years has almost exclusively been centered on the problems and prospects of the technologically advanced countries Even when the scope of the discussion was extended to the entire world it was handled mostly from the vantage point of the developed countries In the realm of future studies the developing world has eclipsed to a virtual invisibility One may thus ask Is futurology relevant to the developing countries at all?

One encounters a paradox here one may say on the one hand that a develop ing country could hardly afford to think about the future because her present is so full of problems and her future is so fraught with uncertainties yet one can also maintain conversely that it is all the more necessary for a developing country to think about the future because it is only by doing so that the future can be actualized—nowhere could the self fulfilling prophecy apply better

The purpose of this paper is to first explore the various ways in which develop ing countries meet or are visited by the future and then to suggest some of the ways whereby the future could be introduced in accordance with a positive development policy The Korean experience in recent decades will be used as the main empirical reference

## Future and Development

Numerous studies have been made regarding the process by which economic and social development begins Various factors have been singled out as the key variables in setting the developmental process in motion Theories of develop ment range from those starting from the vicious circle of low income and inability

to save and hence the need for big capital inflow to those emphasizing the emergence of individuals and groups with achievement motivation [1]

But once we look at developmental process with an optique of the time dimen sion we notice a remarkable fact that wherever development occurs there is introduced the future [2] Thus for instance when a businessman makes a large capital investment there is an implicit calculation that foregoing the consumption of the capital in the present would yield a greater long term return in the future The same holds true when a government launches upon an economic develop ment plan there is a conscious design that by marshalling various scarce re sources over the plan period the long term growth could be maximized Likewise achievement oriented individuals and groups regard the future as the scene on which they would realize their expectation by nature therefore they have a greater trust in the future than in the present or the past An ability to look into the future is one of the indispensable human qualities required for and conducive to development [3]

## Three Modes of Future Introduction

While the correspondence of future introduction with the development process is clear the modal patterns whereby the future unfolds itself on the social scene vary depending on the dominant socio psychological attitudes of the people sponsoring that introduction at a given time in a particular society The crucial attitude is that regarding social change among those who are generally responsi ble for the management of the society at the given moment Three varying attitudes can be identified regarding social change a) passive attitude b) explo tative attitude and c) positive attitude

To those with a positive attitude toward social change future opens up a wonderful opportunity It serves to increase the scope of their knowledge and inspires them to search for the unknown It challenges them to try to catch up with the modern world To those who view change as an opportunity future is linked to the idea of progress Future becomes a helpful instrument available to them in their struggle for a better life [4]

When social change is viewed in a passive way on the other hand future be comes a burdensome pressure It presents itself in a chain of changes so rapid so unintelligible and so uncontrollable that man feels lost and helpless In such a perceived process of relentless change the past and the present are senselessly used up as raw materials in the fabrication of an unthinkable future Individuals and groups possessing such a passive view of change distrust the future The outcome of distrust of the future is an attitude of escape usually expressed in nostalgia toward the past

A third attitude toward social change is possible and occurs frequently It tries to maximize short run returns through manipulation of the existing circum stances This is an ambiguous attitude It is a distorted response to the pressure and tension of social change

These different attitudes toward change tend to color the future which is brought in at a given time Thus for example when the responsible managers of the society possess only passive attitude toward change the future they encounter



is not one that they themselves sponsor It is rather a storm which overwhelms them In this situation they become victims rather than sponsors of future Thus the kind of future that is brought in under their auspices (or lack of auspices) is an *explosive* future a future which arrives in a sweeping manner On the other hand when the responsible managers are in good command of social change and have a positive stance toward change they can order or plan the future so that it could be brought in in a less disruptive and more orderly manner This we may call an *ordered* future In a situation where social change is sweeping the scene and yet no responsible change managers are in sight some individuals or groups may rise to exploit the fluid circumstances with force If by fortune such a group transforms itself into responsible managers of future a most happy outcome may be obtained but should such a group choose to use the opportunity to aggrandize its own narrow interest or to effect some pent up revenges, the situation would become aggravated and the future thus introduced would be a strained one This we might call a *pre empted* future

Thus according to the manner in which social change is met future comes into the history of a society in three different ways viz

1) explosive future
2) pre empted future and
3) ordered future

Below we shall see some illustrations of these different modal patterns of future introduction

### explosive future

This is a situation in which cumulative rapid social change generates broad new social forces which under accumulated frustration erupt in expectation and demand of a utopian future all at once In this situation the traditional elites are generally behind the time and incapable of responding to such change Yet no organized force exists to manage and canalize the torrent of the new future which arrives in an unexpected manner Most of the student unrests and the related crises of generation change in developing countries can be largely ex plained from this angle A classic example is the April Student Revolution in Korea in 1960 in which student uprisings not only toppled the 12 year old regime of Syngman Rhee but also exerted broad impacts on various aspects of the Korean society as a whole [5] The current wave of student power in many industrial or post industrial societies in protest against the industrial order is a new example of this kind of future What might be quite natural to the youth could be viewed explosive by the existing managers of these societies

### pre empted future

A pre empted future is closely related and often consequential to an explosive future When erruptions occur in which the future is opened up in a utopian way chaos is likely to prevail For a developing society such lack of order is unbearable however desirable the glimpse of the future may be A usual conse quence of such a social chaos is a period of disappointment and frustration At such a moment it is quite possible that some particular group within the general spectrum of newly emerging social forces moves in force to take charge of the situation

In the recent decades this kind of future introduction has often taken the form in developing countries of military coups The Military Revolution in Korea in May 1961 at the wake of the Student Revolution of the preceding year may be cited as an example [6] The emergence of Suharto regime in the aftermath of a nationwide turmoil in Indonesia in the aftermath of the downfall of Sukarno may be another example [7] There is an element of surprise in this Legitimation may be lacking at the outset yet a forward momentum is provided

**ordered future**

An ordered future is a state in which the existing and emerging changes are met on a continuing basis so that the future is regarded as being reasonably manageable In this state relatively regular patterns are gradually developed in which various future opening societal energies become systematically absorbed in the ruling mechanisms of the society Developed societies usually possess a wide spectrum of absorptive mechanisms but developing countries have few mechanisms if any of this nature And from the purview of this paper it is precisely the lack of such institutional mechanisms which makes these countries less developed Now the question arises Where can one begin and how?

The most ideal way is the gradualist approach whereby over a long period of time a whole complex of future oriented institutions and mechanisms get built and carefully husbanded This is of course the most desirable way but in many developing countries the reality of social change may not allow such an orderly evolution to occur Short of this there are some less ideal roads—somewhat circumspect—along which an ordered future has to be sought One is the case of reformist elites out of the traditional forces becoming themselves the agents of future before an erruption takes place Another is the case of some pre emptive forces acquiring and improving legitimation A classic example of the former case may be the Meiji Restoration in Japan in the last century and a contempo rary model may be the Shah s Revolution in Iran [8] The latter case might be illustrated by the Modernization Programme by the administration of President Park in Korea since the restoration of civilian rule in late 1963

There is no rule of sequence among the three categories of future which have been mentioned above The most desirable pattern is the obviation of the first two categories which could rarely be the case in developing countries A lesson that can be drawn from recent experiences of social and political change in developing countries is that once an orderly change is not possible and once an explosive or pre empted future unfolds this must be converted into a more ordered future as soon as possible Thus whether the future is introduced in an orderly manner or not ultimately a developing society must develop its own inventory of outlooks and capabilities in managing the evolving future in a systematic manner Below we will consider some of the policy instruments that can be marshalled in the creation and management of an ordered future

## Policy Instruments of Future Management

Sustained development requires that once future is introduced—regardless of the manner in which it is introduced—it is managed well This further requires



the presence or emergence of able and responsible managers In any developing country the source of future managers is not limited to government officials although the overriding role of political leaders and administrators in such a society is not to be minimized The pool encompasses the elites in the broadest sense of the word In a typical developing society it would include political leaders of both ruling and opposition parties senior administrators senior members of the officer corps of the armed forces leaders of the press managers of the press managers of large business corporations university professors leaders of religious and other social organizations etc

Once the pool of potential managers of future is identified then these manag ers must in the interest of an ordered future become engaged in proper mecha nisms and processes by which they can effect the injections of future elements into the workings of the society Mere talk of the future is not enough There must be people who get saddled onto the vehicle of the future Naturally there will be some eliminating and multiplying process here some will drop out others will join in the process

Below let us consider some of these mechanisms and processes whereby potential future managers encounter each other and are welded together

Four broad types of policy instruments can be mentioned which are used explicitly or implicitly by different governments in an attempt to introduce and diffuse the future dimension They are

1) multi year development plans
2) creation of future institutions
3) undertaking of special growth projects
4) opening up of the private sector

Let us examine some special characteristics of each of these instruments

**Multi year plans**

Multi year development planning is perhaps the most familiar policy instru ment designed to introduce the future Although it is difficult to mount a plan of this type where it has not been tried before this has a potent norm setting impact once it is instituted

A five year economic development plan is the mode Although there are some developing countries which demonstrate considerable economic vigor without explicitly using this instrument yet the evidence is on the side of a significant number of developing countries which have used this scheme and have achieved considerable success Most of these success cases attest to one thing the national leaderships concerned make concentrated use of a five year plan as a positive instrument of development policy They use this not only as a means of economic policy to promote domestic savings foreign capital induction infrastructure building but also as a mechanism of harnessing the entire government machinery as well as the whole nation to the broader goals of national development Thus under an enlightened national leadership a five year plan could transcend itself into the realm of values For instance it could have its spread effect in other spheres such as industry universities social and religious organizations and even households inducing and encouraging these organizations to have some planning Of course these organizations can plan even without the impetus of government planning but the fact of life in many developing countries is that

once government plans others tend to follow suit And once this habit spreads among the people a new social norm is created according to which people s eyes and minds are gradually cast toward the future

Such serial plans if seriously undertaken and managed can initiate the invaluable communication process in which declarations of intent are advanced from the government and at the same time a wide forum is created providing other potential managers of the future the opportunity to join the discussion Thus for instance during the first few years of Korea s First Five Year Plan (1962–66) a high style national forum was opened between government leaders who expounded through a series of inaugural messages and policy speeches their philosophy of the Programme of National Modernization on the one hand and the chorus of opposition leaders and other opinion leaders of the society such as the press academia and the religious circles in their general attempt to moder ate the haste of the Programme on the other The relatively smooth transfer from the military regime to a civilian constitution and the accompanying economic take off around 1965 was effected in such an atmosphere of animated discussion of national goals

**"Future" institutions**

Future oriented norms can also be spread by deliberately creating special institutions whose expressed purpose is to create new standards of performance or to suggest new quality of life in the future This is a way of identifying and nurturing future oriented individuals and of accumulating such knowledges and expertise In Schumpeterian terms development means new combinations and this requires tremendous mental freedom which presupposes a great surplus force over the everyday demand [9] If this is a good justification for special institutions for developed countries, it is all the more so for developing countries

Research institutions and science and technology institutes are good examples Science has an enormous future linkage inherent in it Thus the fact that scores of scientists are brought together by a developing country for the purpose of developing new technologies or new combinations of technologies for the country has a tremendous future opening effect for the entire society The spread effect of a science institution for universities and industries cannot be overestimated The case of the Korea Institute of Science and Technology of which a presentation has been made in this Conference by its Director can be cited as an example in this regard

Universities can also have important future opening role If a university sticks to the conservative role of relaying what is traditionally considered to be valua ble there is no future effect If on the other hand a university is bent upon the innovative role of orienting young men and women for their new roles in the changing society the future impact of the university will be immeasurable Thus not only the curricular content and the composition of the faculty and students but the very air of a campus has a great bearing on the future relevance of a particular university A university in which the spirit of innovation and experi mentation is overflowing has a great social role in leading the society toward the future [10]

One aspect that is not adequately handled in the discussion of look out



institutions [11] is that of social alliance forged among various enclaves of future studies Like any islands of development members of future institutions are at best lonely by themselves and need all the supports and encouragements they could get This is especially true with pioneering institutions in developing societies Hence there develops remarkable cross fertilization and even some gravitational pull among members of various forward looking institutions of a developing country Taking the example of Korea in the latter part of 1950 s such institutional interactions took place among the members of the research department of the central bank a few bureaus of some economic ministries a few development corporations and some staff colleges of the armed forces [12] More recently the Korean Society for Future Studies whose members are drawn from various institutions is providing a significant forum of pan disciplinary cross fertilization and interaction [13]

**Special growth projects**

Sometimes large scale construction projects such as a highway or a high dam have important future opening effect for a developing country The Seoul Pusan Highway and the Aswan High Dam in Egypt are cases in point By bringing remote areas into meaningful zone of communication with metropolitan centers or by bringing valuable goods and services such as water and power to the hitherto backward areas large infrastructure projects help introduce new attitudes toward life—new sense of time and space—to the people who have hitherto been separated from the main currents of their society

Related to major infrastructure projects is the policy of deliberate creation of special growth regions [14] This could be a special industrial district or a model city The rationale is opening up a whole region which might have otherwise been kept backward Usually a large sum of financial resources are poured in A complex of propulsive industries and related infrastructures are built Often a technical college or university is localized Various procedural barriers are waived Often tax benefits and other preferential treatments are given The Ulsan Industrial District which was created in the southeastern coast of Korea early in the 60 s is a good example

Such a development region can act as an important center in which new experiments in industrial technology and procedure can be introduced It can also become an important counter pole in economic as well as socio cultural develop ment

**The private sector**

Orderly management of future requires among other things opening up new possibilities latent in the society—possibilities other than those authoritatively planned and declared It also requires the absorption of ever arising new possi bilities into the regular channels of planning so that these might not become alienated and become eventual sources of erruption In a developing society a great deal of such latent social energies lie in the private sector especially in education business and the press

Thus when a developing country decides to establish for the first time private universities beside long standing state universities as is being contemplated in Thailand it is a highly significant act in terms of introduction of future Also

when a country whose dominant institution is government bureaucracy and whose industry is in a state of infancy decides to build a large complex of private industry as was the case with Japan in earlier generations and with Korea in the recent decades this act has an immense impact in the unfolding of the future in the society Above all it tends to add new socio political dimensions to a society in which the traditional route of social advancement has been too rigidly structured along the university bureaucracy axis to allow for a better balanced social progress

**Summary—A Synergistic Use of Policy Instruments**

A developing society is by nature bound by various kinds of tradition and mores which tend to militate against the introduction of future A deliberate effort must therefore be made and policy instruments must be chosen and marshalled But no single policy is adequate to break the hold of the past A coterie of policy instruments must be used in order to have a kind of synergistic effect A critical mass of policy mix must be obtained What should be the particular mix of a particular society depends on the situation or rather the perception of the situation of a particular country What is needed is the sensi tivity to such policy instruments and flexibility in using relevant tools in light of the onrush of change in a particular society The difference in the use of the policy instruments may determine to a significant extent the rate sequence and direction of developmental process in a society

## Futurology or Developmentology?

Can a developing country have futurology? If yes what kind of futurology is relevant to such a country?

The position of this paper is that the very will to have development presup poses that a developing country wants to open the future for its people and hence needs future thinking But the futurology required here is different from that of developed countries A country beset with domestic problems and international influences could hardly expect to fully engage in such sophistications as techno logical forecasting But even a less developed country cannot afford not to have future introduction for resignation here would forfeit autonomy And future introduction must be expressed in terms of concrete actions and policies It is only through the media of such future oriented policy instruments that a climate is gradually created in which the society begins to become conditioned to look toward the future Once such a climate is created then more sophiscated future studies could be initiated Under proper policy stimuli more variegated future studies could emerge

The alternative for a developing country is not so much between alternative futures but between whether or not to try to have a future a relatively ordered future What is important for a developing country is not so much charting out the future course of events as increasing the will and capability to meet the manifold challenges of the future This is the very essence of development This is why futurology for developing countries boils down to *developmentology*



## NOTES

1 See for example Ragnar Nurkse *Problems of Capital Formation in Underdeveloped Countries* (New York Oxford University Press 1953) and Everett E Hagen *On the Theory of Social Change How Economic Growth Begins* (Homewood Ill Dorsey Press 1962) and David C McClelland *The Achieving Society* (Preceton N J D Van Nostrand 1961) For a latest global perspective see Lester B Pearson et al *Partners in Development Report of the Commission on International Develop ment* (New York Praeger 1969)

2 For an exposition of a time dimension approach to development see my book *Korea Time Change and Administration* (Honolulu East West Center Press 1968) For a resume see my article From Time to Ecology *Ekistics* Vol 25 No 151 (June 1968) 432–38

3 A similar view is expressed by Timbergen who cites the following five principal human requisites for development an interest in material well being an ability to look ahead and to take risks an interest in techniques and in innovation persever ance and an ability to collaborate with other people and to observe certain rules See Jan Timbergen *Development Planning* translated from the Dutch by N D Smith (New York McCraw Hill 1967) p 26

4 For further elaboration on the nature of this and related time orientation see my writings in note 2 above

5 For detail see *Korea Time Change and Administration* chap 6

6 See *ibid* chap 8

7 See Sondang P Siagian Improving Indonesia s Administrative Infrastructure A Case Study in Administrative Reform in Hahn Been Lee and Abelardo G Samonte (eds ) *Administrative Reforms in Asia* (Manila EROPA 1970) pp 95∼ 124

8 See Manoucher Goodarzi Administrative Reforms in Iran *EROPA Review* Vol 8 No 1 (June 1968) 44–69

9 Joseph A Schumpeter *The Theory of Economic Development* (Cambridge Mass Harvard University Press 1951) p 86 A similar argument advocating the creation of future interest units in government structure can be found in Yehezkel Dror s article The Role of Futures in Government *Futures* Vol 1 No 1 (September 1968) 40–46

10 The *Proceedings of the Asian Workshop on Higher Education* with the theme A New Man for a New Society Universities and Colleges as Agents of Change held at the Chinese University of Hong Kong 18–30 August 1969 is a good documen tation of reports of six seminars dealing with the future roles of the university including innovation and experimentation

11 See for example Robert Jungk Look out Institutions for Shaping the Environ ment *Futures* Vol 1 No 3 (March 1969) 227–31

12 For detail on the emergence of future thinking in the aftermath of the Korean war see *Korea Time Change and Administration* pp 87–90

13 See Chungho Choe et al (eds ) *An Inquiry Into the Future Collected Essays* (Seoul The Korean Society for Future Studies 1970) This book was distributed as Con ference document

14 For a similar treatment of growth regions as policy instrument see J R Boudeville *Problems of Regional Economic Planning* (Edinburgh At the University Press 1966) p 18

15 For a suggestion of a synergistic theory of development see Eugene Staley Com binations of Factors and Development Theory *Economic Development Issues and*

*Policies* Dr P S Lokanathan Seventy Second Birthday Commemoration Volume (Bombay Vora 1966) chap 1

# CRITICAL AND ESTABLISHMENT FUTUROLOGY

BART VAN STEENBERGEN
*Secretary Workgroup 2000*

Although the word futurology was already used in 1943 by Ossip Flechtheim it was not until the second half of the sixties that future research received widespread attention Personally I see a relationship between the growing interest for the future and the radical protest movement which arose during the last few years in our highly industrialised western world In a time of radical change the more conservative people have a strong need for certainty They look for people who can tell them what the society in the future will look like According to my opinion they are asking the wrong question for nobody can tell them what the future will be unless we create a society in which the future behavior of human beings can be fully manipulated but that would mean a one dimensional society in which human beings have lost the freedom and the possibilities to transcend the given situation to break through in order to create something which nobody had thought of before

There is however another group of people who have been interested in future developments for a somewhat longer time Here I am thinking of the planners In the last few years it is becoming more and more clear that western capitalism is performing an operation in great style the future—or better the present thinking about the future—has to be integrated into the existing political economic system and has to be cut off from radical change We are facing a colonisation of the future by the modern productionsystem which needs future research as a method or as a social technique for the prevention of economic crises

The development of modern industry (I am particularly thinking of big industries like electronics computers airplanes chemical industry etc ) needs a long term investment through which planned capitalism has become an objective necessity This means that planning—which was originally an idea from the left—has been integrated into the existing order Precisely because planning was originally a concept from the left (against the laisser faire attitude of the early capitalists) the traditional left has not seen through this tendency toward integration into the exciting order on the part of the modern capitalist planning

Not only the planners but also the futurologists contribute to this tendency in

the direction of planned capitalism and with that they serve a destructive authoritarian repressive and inhumane society

Coming back to the protest movements our time is characterised by radical change This sounds like a platitude and in many ways it is However when in the literature—or on conferences like this one—people speak about change they generally mean that the existing tendencies in the dominant culture develop with great speed that our society is like a train moving faster and faster in a certain direction Very often the comparison with a stream or a rapid is used in this context When I talk about radical change I mean something quite different I am aiming at the growth of a countermovement or in dialectical terms the growth of the negation of the existing social order and its development It is not the dominant culture we are interested in in this respect not the thesis but the anti thesis We are living in a time of a cultural revolution (culture defined here in the broad sense of everything that man adds to nature) This means that what is going on now is a total and fundamental revolution It is total because it affects all social fields the revolutionary process is not only going on at the universities where it is most visible but also in the churches—I am thinking of the under ground church as the negation —in familylife where communes are tried out as radical alternatives sex the schools art politics and also—and that is important for us here—in the sciences and particularly in the human or social sciences

In addition the cultural revolution we are in now is a radical revolution which means that it attacks the foundations of our culture (Radical comes from the Latin word radix which means root)

There have always been critical people and protestgroups but generally the criticism of these groups was directed against some part of the society and not against the social order as a whole and generally it was criticism from within meant to improve the existing order These people—you may call them liberals and I think that many of the people here belong to that category—believe that the existing society is basically a good one or at least the best possible one and that by a gradual improvement we can come to a better society The radicals wonder something which is basically repressive authoritarian and exploiting should be improved at all I want to give an example to make this clear Liberals and radicals are both against the war in Vietnam Both categories will strongly protest against this war The liberals however are inclined to believe that this war is a mistake a tragic error not typical for the American society The radicals on the contrary are convinced that this war is an inherent and integral part of the development of the American society and that more Vietnamese wars are to be expected

When I talk about a cultural revolution a few things must be made clear In the first place it is evident that we are not yet in the revolutionary phase but in a *pre* revolutionary phase at most that means that we are in a phase of the awaken ing of consciousness that our society is repressive destructive etc Whether we will ever reach a revolutionary phase is uncertain and even doubtful In this re spect I share the relative pessimism of Marcuse that the possibilities to encapsul ate radical change attempts by the existing social order are very great The planners and the futurologists play an important role in this encapsulating process Next to that when the radicals speak about revolution they refer to a *process* The idea of a revolution as a coup d etat as something that happens at a



certain time in history (like Russia 1917 where one powerelite was replaced by another ) is given up Revolution is now seen as a permanent process as a revolution permanente a permanent struggle for more freedom for more participatory or direct democracy for less authority for more influence of more people in more circumstances The radicals however do not believe that this process will take place gradually step by step since the establishment is basically not willing to give up its powerposition

This process of the cultural revolution has reached the sciences and particularly the human or social sciences The criticism of many of the young scientists is not only directed against the *application* of the sciences—this type of criticism is already somewhat older I can refer to the Pugwash conferences e g —but goes deeper and is directed against the *foundations* of science

It is impossible in this context to go very deep into this discussion which in Germany is known as der Positivismusstreit in the German social sciences I only want to mention a few elements that may be relevant for the futurologists In the first place it has always struck me that when new social sciences like sociol ogy political science psychology and now social futurology came up in the beginning of the 20th century they suffered from the great succes of the natural sciences in the 19th century Particularly under the influence of positivism and particularly in the Anglo Saxon countries these new social sciences took over the methods and—what is even more important—the way of thinking the way of looking at reality from the natural sciences Sociologists and psychologists looked at human beings in the same way biologists looked at a colony of rats namely as the complete outsider who just observes outward behavior behavior that has to be measurable and quantiviable It is really not meant as a joke when the sociology students of the university of Amsterdam organize a conference with the title Sociology should be a human science

The positivist tradition also has created social sciences in which the search for laws and regularities was very dominant Sudden unique historical happenings or eruptions could not be explained by the traditional social sciences It is really amazing how little insight these social sciences can give into the revoltmovements of the last five years Many sociologists psychologists and also futurologists try to explain these phenomena by saying it is just a somewhat stronger generation conflict and as you know the generation conflict belongs to the regularity vocabulary

In addition the search for laws gives the social process an unavoidable character In nature we have to do with regularities and laws typical for human beings however is that they are not locked up in dem Seinde (a given form of existence) but that they always and on unexpected and unpredictable moments can break through the existing reality or in dialectical terms transcend that existing reality

My third point is the category of prediction forecasting or whatever word is used This category was also mentioned in the letter that Robert Theobald has sent to the conference participants The prediction of future events has always been considered the highest goal of science

As soon as we have enough insight into the regularities and into the causal laws of the phenomena we can predict how these phenomena will behave in the future We can think of the weather we know more and more about the phenom

ena that influence the weather and by putting all their data in the computer we can forecast the weather Many people and also many futurologists believe that in principle we can do the same with data about the behavior of human beings These futurologists will admit that at this moment we can forecast the weather rather well but not human behavior but according to them this is just a matter of the difference in complexity of the two phenomena not of—as I personally think—the *fundamental* and *essential* difference of the two the first being a natu ral the second being a cultural phenomenon

This brings me to my fourth point which is brought forward rather strongly by Herbert Marcuse Marcuse states that we have built up our science and technology as a *Herrschaftswissenschaft* the aim of science and technology is the *dominance* over the phenomena the control of the phenomena or to say it in a more negative sense the manipulation of the phenomena In the relationship between men and nature most people would not object to such a relationship of submission and domination although even in that field some questions are to be raised as e g Marcuse does The problem is more outspoken when the same concept is transplanted from the natural sciences to the social sciences As we all know knowledge is power and knowledge of the behavior of people is power over the behavior of those people Here the problem is that we are not dealing with the application of science but according to Marcuse and others is the *dominance principle* inherent in our scientific thinking as such We can often notice a strong anti science and even anti intellectual attitude among the radical protesters of our time This attitude is quite different from the anti eggheads attitude we can also find in our society These protesters just mean to say that science has created enormous possibilities for the manipulation of human beings in a very subtle way Science has become an integral part of our repressive and authoritarian society and it is not true that science as such is neutral and that it is just the application that does the bad things on the contrary in our scientific thinking an implicit Herrschafts a dominance, ideology is present

I am convinced that as soon as we can predict human behavior we have reached the one dimensional society in which all radical change attempts all negations to overthrow the existing social order are encapsulated It is typical for the vocabulary of the planners and futurologists that they speak about *plan ned* change

I must admit that in certain historical situations planning is progress in relation to the alternative the laisser faire attitude of the early capitalists In the same way we can say that positivism in its time was progress in relation to meta physical thinking However planning is more and more becoming a means of the establishment to continue its powerposition into the future

The dialecticians like Habermas Adorno and Marcuse have tried to formulate an alternative way of scientific thinking the dialectical one It may be doubtful whether dialectical thinking is *the* answer Dialecticians are very often unclear in their statements weak in their methodology and some of the traditional dialec ticians like Marx have strong positivist elements in their theories of science There are however a few important elements that the dialecticians have in troduced In the first place many of them reject the notion of a *Herrschaftswis senschaft* a dominance science Knowledge according to Marcuse should not be



control of people but should be an eye opener by which a human being can transcend his situation Positivists are primarily concerned with phenomena as they exist here and now (they like the hard data) The dialecticians emphasize that man is a creative being that he is always able to create something new Knowledge and science should always stand in that field of tension between actuality and potentiality between the situation as it is here and now and a future being a possible being the ideal between the is and the ought The true field of knowledge and science is not the study of the phenomena as they are is not directed on the given fact but on the critical value judgement which is the prelude to the transcendence of the given form Knowledge is engaged with the phenomena in order to transcend them for that which is cannot be true (Bloch)

The next problem I want to bring to your attention is the perspective—or the ideology—of the social scientists and of the futurologists on society The socio logist John Horton has made a very clear distinction between the order—and the conflictperspective on society Naturally we cannot fully separate the two for nobody believes in a society with complete order and no conflicts and on the other hand nobody will think only in terms of conflict and deny that there is any order at all but it is very important which concept of the two is emphasized The great majority of the social scientists and of the futurologists still have an order perspective on society

There are a few elements in both perspectives which are relevant for us here Theorists with an orderperspective generally have a positive attitude towards the maintenance of social institutions balance stability authority and order are positive values (often more implicit than explicit) Society is seen as a boundary maintaining system of action the order theorists have basically an organicistic perspective on society that means that society is seen as an organism an inte grated system in which the different parts work harmoniously together so that the whole can function Change is primarily seen in quantitative terms and in terms of a moving equilibrium which should not be disturbed Very important is the evaluation of deviant behavior For the ordertheorists radical deviant behavior is seen as an illness and as a danger for the functioning of the social system There is a great fear of anomie and chaos and the solution is the extension of social control and a more efficient institutionalisation of the existing values in the social system In short the ordertheorists have an adjustment ideology

Liberalism is a somewhat enlightened variant of this model for although the liberals are somewhat more progressive than the status quo supporters they only accept deviant behavior within the borders of the existing social system

Theorists with a conflictperspective look at society as a process a permanent struggle between groups with controversial goals aims and perspectives They have a positive attitude towards qualitative change Deviant behavior is seen as a possible anticipation on a radical reconstruction of the existing social order Conflicttheorists often look at society as a dialectical process in which there will always be a dominant group (the thesis) an opposition (the negation) and con flicts between these two out of which a new and qualitatively different society will emerge (the synthesis) There are however some essential differences in society perspective between the modern radicals and the traditional dialecticians The last group is also primarily concerned with the conception of order they only see the necessity to replace the existing social order by another and better

one Conflict in that concept is only meant as temporary and only as a means to an end namely a better social order For the new radicals the whole notion of society as an order is rejected their norms and values aim at a revolution permanente a permanent revolution since these norms and values are a process in itself Democracy for example is not something that is ever reached but something that has to be conquered over and over again Particularly when the ideal is a participating or a direct democracy which means a strong decentralisation of power a fight against any centralisation of power is permanently necessary for the tendencies towards the centralisation of power are very strong in our society Change and conflict have become a style of life For the conflict theorists the breakthrough through the existing social control is very essential They definitely have a more positive attitude towards all those groups like the New Left Hippies Black Panthers etc who are standing in the negation outside the dominant culture and who may be the predecessors of a new and qualitative different society

In this whole process where the foundations of our scientific theory as well as the perspective we have on society is sharply discussed it is possible to distinguish between two more or less opposite schools of thought in social futurology

I have called one school in a somewhat challenging way establishment futurology This school which is undoubtedly dominant now has an outspoken orderperspective on society and has strong ties with the positivist tradition This school can also be seen in connection with Theobald s first school in which extrapolation is the basic methodology The establishment futurologists have strong ties with the existing social order partly ideological ties partly financial ones partly both

In his great work Prognostica my fellow countryman Prof Polak discusses the sixteen most important modern prognosis techniques It has struck me that with the exception of a few mathematical and statistical ones most of the other techniques have been developed and tried out in the context of either a military or an industrial setting

My problem is now whether we *can* and *should* use these prognosis techniques for the society as a whole or for other social fields in society Many people will state that prognosis techniques are absolutely neutral that they are like a hammer which can be used by left as well as by right wing people and can be used to put a nail into the wall as well as to kill a person by hitting him on his head In other words techniques—like a hammer—are neutral only the application adds the value element to it Concerning this matter I have my serious doubts when we have to do with *social* techniques I believe that in most social techniques an implicit society perspective is present To give an example Prof Polak discusses games strategy and simulation as prognosis techniques these are developed and used in military planning The question is now whether there is an ideological moment in strategic thinking or not In his book Strategy and conscience Anatol Rapoport has made very clear what type of implicit view on society and on human behavior these strategic thinkers have and that strategy games are not as valuefree and objective as the makers of the games like to suggest on the contrary strategic thinking implies knowledge of human behavior in stress and threatening situations The fundamental belief however is that the higher you build a wall of deterrence the less likely it is that your opponent will do something against you



The belief in deterrence is an ideology It has been the basic ideology of the cold war

The military and to a smaller extent the industrial systems are almost ideal types of ordermodels closed hierarchical systems with one rather clear goal There is no room in these systems for deviant behavior This is the reason why—from a radical point of view—it is not undangerous when techniques developed in the army and in the industry are transplanted to other social fields

I consider the year 2000 a study written by Herman Kahn and Antony Wiener an idealtype of an establishment futurology study The book is basically built upon the extrapolation of the present dominant culture into the future The possibility of a dialectical turn is not even taken into account Everything that deviates from the standardworld (the word is enlightening) is either ignored or described with horror and meant as a sort of warning The radical blacks will be integrated in middle class America the rebellious youth is protesting because they do not know how to spend their free time they are the spoiled generation Some of the scenarios remind me of the nightmares of anti communists

Next to that here we have a good example of futurologists who are a product of the ideology of the military industrial establishment This establishment is highly interested in future studies because they can give them the tools and the weapons to continue their powerposition This is my second point Many of the establishment futurologists are not only ideologically but also financially bound to the existing powerelite Many of the so called thinktanks are good examples of this phenomenon

Next to this school of establishment futurologists we can see that a somewhat divided group of what I have called critical futurologists comes up This school has a conflictperspective on the social process and in their scientific approach (they often call themselves critical theorists) they reject positivism and they try to find out what dialectical thinking can teach them This does not mean that they simply accept the theories of the dialecticians on the contrary in the theories of many of the dialecticians one can find a belief that the dialectical process is also submitted to certain laws Several of the critical theorists have made clear that in the work of Marx for example there is a great deal of positivistic thinking Robert Theobald has made a few remarks on his interpretation of this second school In my opinion Theobald has made a caricature of this school but basically he is right when he states that this second school believes that there are no essential limits to the process of creating the future man s will is sufficient to create the desired world This is true in this respect that this second school thinks that up to now we have submitted ourselves too quickly to certain phenomena which we like to call laws or inevitabilities It is quite clear that there are a number of natural limits but given that fact we have a much greater freedom to create a culture in the way we want it than we often think Many futurologists often state that the development of technology automation and cybernetics takes place in the form of an exponential growth and that we can do nothing about that The only thing we can do is to educate a new generation to live with this phenomenon that means to adjust to the inevitable Technology and automation however are products of our culture and for that reason not submitted to some sort of natural or other law although I must admit it often looks

like that We can see already the emergence of a mild anti technology mentality among the younger generation because according to them technology dehuman izes our society I do not want to go into the question as to whether or not this is true or better in how far this is true neither do I want to predict whether this mentality will become dominant the only thing I want to state is that we should not exclude the possibility of a turning point in such a way that technol ogy automation etc will play a less important role in our future society than we are inclined to think now and that it is possible that we will direct our attention more to other fields The crucial point of the critical futurologists is that it is possible that the people will start to believe that there is nothing to do about the development of these phenomena this might create a highly undesirable apathy a belief that we can only adjust to the inevitable and cannot create our own culture From the dialecticians we can learn that in history often the dominant trend of a society seemed to go inevitably in a certain direction but that same society was already creating the negation of that tendency When Theobald states that for the second school (which dominates many of the protestmove ments) the past is essentially unreal it is essentially not true On the contrary we can learn a lot from the past but since man is a transcending being the past should not lead to apathy Experiments that have failed in the past (take for example anarchism) need not necessarily be a failure in the future What we can learn from the past are the conditions of that failure and then we can ask our selves whether and in how far conditions have changed or whether the conditions can be changed so that we can start similar experiments again

The critical futurologists are influenced by the whole process of the cultural revolution in such a way that they reject a futurology or any science as a l art pour l art On the contrary they think that science in general and futurology in particular should play a catalytic role in the whole process of participatory or direct democratization the breakdown of authority and centralized power It is quite clear that they also reject a neutral valuefree or objective futurology and that their basic solidarity is with the suppressed people and not with the establish ment

Critical futurologists are interested in those groups which have moved out beyond the dominant culture and which are now permanently challenging that dominant culture Arthur Waskow has brought up the interesting concept of creative disorder I do not want to go into that since he will speak after[1] me

The more enlightened futurologists often talk about alternative futures (plural) and that is indeed progress To have a choice between two or more futures is better than the choice of only one future in the same way the choice between two or more political parties cars t v sets laundrymachines is progress in relation to the situation where there is only one political party t v set car etc available Nevertheless it fits in our competitive society that even the future becomes a product on the market and that a passive and neutral population can choose the best offer Our whole conception of democracy is based upon this competitive theory The main objection is that the products we can choose are already prefabricated by others I can choose between many cars but I cannot

[1]Unluckily Waskow did not appear in Kyoto He was too busy with the revolution at home



play a role in the process around the fundamental questions of private and public transport We face the same problem when we talk about alternative futures Who is going to make these alternatives? And isn t it true that the framework inside where the alternative futures are located is set by others? Even more important than the final choice is the process of thinking about all the possibili ties for the future and that may be a very essential function for a critical futuro logist that he is not going to tell how likely a certain future will be but that he tries to develop the desires and potencies of the population with regard to the creation of their future, for many of these desires and potencies are repressed in our society This means that the critical futurologist is not some type of social engineer but somebody who plays a role in the whole process of the liberation of man from the ties of this destructive authoritarian and repressive society It is in this respect that the critical futurology movement is part of the cultural revolution

# ON FUTURE RESEARCH AND ITS ROLE IN THE WORLD

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## INTRODUCTION

We all seem to agree that the future is too important to leave to the politicians But does that mean that it should be left to the self proclaimed future research ers? When it belongs to all humanity? And more particularly what kind of image of the future of the world do we want to build into the international organization of future research? We know perfectly well that future research is important that it blends with politics and that the colonizers of future research and of future research organizations may also to some extent be the colonizers of the future For that reason it is so important to explore and discuss what kinds of future research we want to promote and how it should be organized so as to avoid a bias in favor of special styles of research special nations in the world and special layers of the population More particularly if future research is to be organized should that organization be modelled after the patterns of the past or be in itself a model of some kind of future we would like to project?

## A TYPOLOGY OF FUTURE RESEARCH

The present short paper is an effort to explore some of these problems starting with a simple typology of future research We need some image of what future research is as well as of what it should be The typology uses four axes for classi fying future research and starts with the simplest one the distinction between *predictive* and *prescriptive* future research

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*This is a slightly revised version of a paper presented at the Second International Future Research Conference Kyoto April 10–15 1970 The author is indebted to many of the discussants for valuable ideas but alone responsible for the analysis and the con clusions drawn The article is PRIO publication no 30 2 from the International Peace Research Institute Oslo

As is well known the assumption in predictive future research is that the future to a large extent is embedded in the past so that it should be possible to pre cognize it by extrapolating from the past These extrapolations tend to be continuous with the past portraying the future as only quantitatively different from past and present They are then usually based on *trend analysis* from the simplest linear extrapolation or exponential formula via logistic formulas to more complex mathematical models But they can also be based on *event analysis* focussing on efforts to map significant events in time The events are usu ally techno scientific (technological forecasting of major innovations break throughs, etc ) or *socio political* (internal wars and external wars) Few seem to focus on cultural events probably because they would be extra paradigmatic not intra paradigmatic like predicting regularities in the development of new Weapons systems The methodology can be *projective* as in the delphi techniques (whether based on experts or population samples) or *retrospective* as in the scenario techniques depending on whether one tries to project from the present towards the event or backward from the event towards the present in order to uncover more or less likely paths in event trees

Then there is the third and equally important possibility of *interest group analysis* Groups in societies are carriers of values and images and it makes sense to predict 1 the relative power balance between the groups and 2 to what extent they will preserve their values developed in opposition and really try to implement them when they come into position Thus we know that youths will become old but not to what extent they will retain their values

All these approaches one way or another use past and present as an important basis for empirical projections We have passed the days of linear extrapolation and we have also passed the phase of continuous predictions An event is by definition discontinuous with the past otherwise it would not be an event But the weakness is nevertheless that all these methods tend to tie our explorations of the future to excursions within variable spaces already defined They are intra paradigmatic as pointed out before They may often look scientific as opposed to ideological because they make use superficially of some of the same machinery as empirical scientific research

But only the philosophically extremely naive will fail to see how heavily ideological this research often is To use the techniques of empirical science to test hypotheses on data meticulously collected and evaluated is one thing to project it into the future is quite another Only if one assumes that the future in its essential parameters will be like the past does this make any sense However valid this assumption may be in the field of natural sciences it becomes a highly conservative misunderstanding when translated into social science research *To predict in social science is to lay the future in a strait jacket* Of course it does not imply that the prediction is in terms of stability no one in a growing liberal society would make that prediction But it means 1 that the future will also be conceived of in terms of the same basic variables that were used to conceive of the past and 2 that the basic laws connecting these variables are the same that there are invariances that cannot be broken To take one example many people seem to assume that in order for a society to become rich to grow there has to be some degree of inequality otherwise there would not be enough motivational force present in the social system A society that is both



rich and egalitarian is often seen as ruled out forever and much futuristic thinking takes place with this assumption Thus the past is permitted to throw a shadow far into the future

In *prescriptive* future research such assumptions are not made The point of departure is not empirical *data* about past and present but *values* one wants to realize Prescriptive future research is like architecture it stipulates values to be realized and then goes ahead to do the job on the drawing table (the theory the blueprint) at the level of the model (the utopian community) in fullscale reality (as an effort at large scale implementation) The architect fortunately does not do only what predictive future research does He does not limit himself to study house building from the past through the present with trend analysis (do houses tend to become bigger? more made of glass and steel? more ugly?) or event analysis (when will the first houses hanging from a cantilever be put into production?) or interest group analysis (will new groups in society favor single family houses?) He transcends past and present trends he creates he breaks apart invariances he makes what has so far been thought of as impossible a living reality Of course he is in the fortunate position that he is operating on relatively small units houses so that it is less catastrophic if he goes wrong The future reseachers using societies or worlds as his unit should perhaps rather *not* be given a *licentia practicandi* from society to implement his ideas on a large scale But it may certainly be argued that society should permit more small scale experimentation And it may also be argued that societies should be so small that experiments are not catastrophic if they fail

The methodology of prescriptive future research looks less scientific to many i e less concealed ideological There would be emphasis on making *values* explicit (e g we want a society that is affluent *and* individualistic) and on bring ing the best possible *theories* to bear on these values in order to translate them into a viable society But these theories will have to some extent to be based on data if only in the form of impressions sampled from past and present which means that the past and present nevertheless creeps into the speculations It may be argued that this is as it should be since nobody would claim that the future is completely unconstrained by the past But prescriptive future research is an effort to transcend the empirical and for that reason theories derived from experiences with the past can only be of limited value and may even be com pletely counterproductive

And this is perhaps the major difference between prescriptive and predictive future research prescriptive research can only be fully meaningful within an effort to create the future now in other words through *practice* through action In *predictive* future research the role as observer may be sufficient the research process is completed with the completed research report and all he has to do is in principle to wait for predictions to be confirmed or disconfirmed Of course he may predict a disaster so confirmation is not a criterion of success since he may have carried out the research in order to warn against potentially detrimen tal consequences of present trends—as in the usual disaster oriented predictive future research (population explosion military explosion pollution explosion) But his contribution is in words not in acts

In *prescriptive* future research this is not enough Testing of a theory can only be done by creating a new reality the research is not completed with a verbal

report it has to be translated into some kind of action For that reason the prescriptionist appears not only as an ideologist because of the emphasis on values but also because he is forced to become an activist—as opposed to the scientism of the predictive future researcher removed from social action—for instance in the ivory tower of a think tank

On the other hand again we also very well know that this image may be a false one The predictionist may participate very actively as a consultant to institutions riding on waves originating in past and present whereas the prescrip tionist has to stir up enough energy to create his own waves In so doing he may become completely marginal often because he thinks he has to try to change the entire society in order to practice some of his views—instead of trying them out in a microcosmos (as the urbanist often does in experimental blocks wards villages or towns) To say that this type of predictionist is less ideological than the prescriptionist is clearly also naive but it is often said To many people support of status quo with minor changes looks objective to challenge it in words and deeds looks ideological

Hence we propose that the distinction between ideological and non ideological future research should be given up and one should rather demand from either camp explicit values The future belongs to all of us Nobody is free and objective relative to it nobody has the right or the legitimation to mould the future on behalf of others in the name of being scientific But that does not mean that one cannot distinguish between different modes of *presentation* as being more or less scientific and ideological The predictionist as mentioned has the advantage that he can express himself in a language taken over from *empirical* science But the prescriptionist can also use a language with high precision and possibility of effective communication he can make use of a language from *theoretical* science Where the former may use trends as a basis for his predictions the latter may use utopian literature and experiments as a basis for his speculations He can be at least as difficult and inaccessible if that is the goal—or at least as *precise* which seems to be a more meaningful goal

We also propose that the distinction between predictive and prescriptive future research should be seen in terms of both—and not in terms of either—or Personally we would be inclined to emphasize the use of prediction research for mapping negative futures as early warning techniques that soon *must* be put in an institutional form and to use prescription techniques for mapping positive futures But the imaginative anti utopia in great and agonizing detail presented by a Marx a Boye a Huxley an Orwell a Bradbury is also a highly meaningful contribution—and so is the effort to balance the almost morbid search for the negative sides of present development with some more cheering views of the future In other words and this is the second dimension we feel that future research should be focussed on positive as well as on negative futures on eutopias as well as on dystopias and they can both be explored by both kinds of future research

But the same eclectic view cannot be applied to the next dimension are we exploring *the* future or futures? The answer generally preferred today is the latter as reflected in names of magazines organizations and so on in the general field of studies of the future To argue against the laser beam type of pin point projection in predictive research as opposed to the less focussed light mapping



out a cone of possible futures is today to whip a dead horse Most people in the field would agree But in prescriptive research this is as much of an issue as ever There is still the issue between *singularists* who would tend to see the future in terms of one ideal type society *the* solution towards which mankind should be brought to converge whether present trends are in that direction or not and on the other hand the *pluralists* who would think in terms of a multiplicity of positive futures

Nor can the same eclectic view be brought to bear on the next dimension which is actually a sub dimension within the pluralist view Thus one may make a distinction between *spurious* and *genuine* pluralism depending on whether the plurality is seen as a potential only a reservoir only from which one picks the best or something that could call for multiple parallel realizations Thus one gets a scale of three possibilities

1 *Singularism* only one future is explored
2 *Spurious pluralism* several futures are explored but the assumption is always that one of them will be selected
3 *Genuine pluralism* several futures are explored with the assumption that all or many of them could be explored

Practices in parliamentary democracies can be used to illustrate this distinction At the first level the government which usually has a better machinery for predic tive and prescriptive future research than the legislature presents only one image of what say the educational system should be like In an autocracy this will then be the final image and be put into practice In a democracy it is usually cleared with the majority party first but there will be possibilities for the opposi tion to make comments that are intraparadigmatic to the image presented Some minor revisions may then be pointed out to accommodate the opposition

At a higher level of democracy rarely attained at present alternative images are presented One way of achieving this is to have them elaborated by a com mittee which is not under any pressure to arrive at unanimous recommendations by compromise but encouraged to agree about how they disagree and to help each other in formulating sets of alternatives This presupposes a way of thinking not much encouraged today but would also give to legislators a much better basis for selecting *one* model As a prerequisite for this the legislature would have a machinery sufficient for expert evaluation of alternative models and also ma chineries for competing with the administration in developing prescriptive and predictive models

At the third stage the idea would be that such models do not necessarily exclude each other For instance different educational systems can coexist as long as there is freedom of choice at any stage In other words the task would not be to explore criteria for selecting one but to explore how simultaneous realization of a *multiplicity* of futures would be possible It should be noticed in passing that this does not presuppose a federal state with decentralization along geographical lines but it does presuppose some kind of functional segregation and decentrali zation

We would strongly argue in favor of orienting future research in this third direction since any other direction only leads to an impoverished future which can easily be petrified or at least become very rigid by means of twentieth cen tury technology Moreover a future research oriented towards alternatives 1 and

2 has built into it so many assumptions from past and contemporary political practices that should not necessarily be carried over into the future by means of something with the pretentious name of future research The third approach genuine pluralism leaves the future more open

Finally we come to the most important dimension in all of this the dimension of *who* shall do future research rather than *how* it shall be done The answer is simple Since there is no doubt about the *for whom?* it is for mankind *for everybody* there should be no doubt about the *by whom?* either It must be *by everybody* It is hard to imagine a field where elitism even in the guise of profes sionalism would be so dangerous as in future research *Time is the new medium of conquest just as much as space was in the past* Strong nations had (and have) the tendency to lay their claims on regions in space and colonize them by dis placing the center of gravity for decision making in their own direction Corres pondingly for time one generation and more particularly one elite within one generation may lay claims to future time territory and make binding decisions for future generations today In other words they may displace the center of gravity in decision making away from the future and towards the present and thereby deprive future generations of an autonomy that is rightfully theirs

## FUTURE RESEARCH AND POLITICS

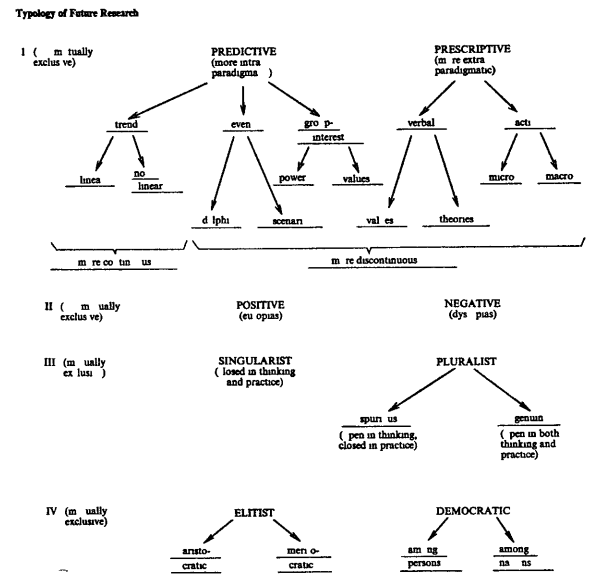
Thus we are led to two problems First there is the idea of *democratizing future research* so that it does not become the monopoly of some people repre senting special interest groups with special views from very special nations but becomes a truly shared activity belonging to everybody who wants to enrich the future and enrich himself by adding that forgotten dimension to his life tied as it is to the present And second there is the idea of *decolonization of time* of preventing one generation from freezing the future by putting human and social developments into so severe strait jackets that future generations take over a future with insufficient degrees of freedom

Examples of this are not only found in the realms of the population military and pollution explosions where future generations are presented with problems so difficult to handle that one really may say that we are living at their expense just like colonial and neo colonial powers have been preying on their colonies Examples are also found in the drive towards convergence of social systems towards homogeneity similarity and generally towards low entropy creating a world with less challenge and stimulation in general In other words it is found in all kinds of singularism and spurious pluralism And it should be noted that these two problems cannot be reduced to one it is perfectly conceivable that the most democratically organized future research with real mass participation will by unanimous decision steer towards actions that lead to colonization in time Democracy is no guarantee against colonization it is just another dimen sion of the total problem we are facing

If we now look back at the list of dimensions of future research it may be highly meaningful to ask what kind of future research has what kind of socio



political connotation and is compatible with what kind of organization of future research For this purpose let us express the dimensions again in a simple typology of future research




Since the predictive future research even when it predicts discontinuities is intra paradigmatic and not action oriented one would expect it to be more estab lishment oriented and more conservative Since it is more scientific in the sense of being more technical and inaccessible to those who do not master the technical language in which it is expressed it will also tend to foster a certain elitism This will not be of the aristocratic variety found in very conservative societies but of the meritocratic variety found in quickly changing liberal societies The quasi empirical basis (which as mentioned is spurious because future research does by definition not deal with data at all since the future cannot possibly have produced any data) together with the tendency to deal with the future from the point of view of the present and the past facilitate a certain consensus formation among other reasons also because technical languages can serve to filter out not only the incompetent but also the disbelievers those who disagree With these conditions satisfied the setting is there for a group of *High Priests of the Future* closely linked to the establishment and well versed in the art of using this type of approach to the future to enhance their own power

There is one particular implication of this that has not been sufficiently ex plored in the debate about future research In a sense the situation has some similarities to the way peace research developed in the late fifties and early sixties as an interdisciplinary effort to come to grips with the problems of

East West conflict * Researchers in the field were not sufficiently aware of the extent to which they became victims of a failure to analyze asymmetrical conflict conflict between rich and poor between strong and weak concerned as they were with conflict between parties more or less at the same level of autonomy and power Correspondingly future research has come to be a synonym for an interdisciplinary effort to come to grips with the problems of post industrial society This is not strange future research as it is known today emerged in countries entering that phase or stage and why should they not explore their own problems?

None would say they should not but with the present power structure in the world in general and the world of intellectual pursuit in particular this has had a number of consequences

1 It was assumed that the future would essentially be continuous with the past particularly where power structure is concerned Societies would be better on the average but the dispersion would remain about the same
2 It was assumed implicitly that what was the near future for industrial nations would be a remote but still very relevant future for more traditional or even primitive societies because of the implicit assumption of a uni dimensional axis of development correlated with economic growth
3 More particularly this meant that the entrance ticket to the future was to be rich no nation with less than say $3 000 in GNP per capita could hope to gain rapid admission to the land of the future Hence there was also an implicit stratification among nations the rich nations were not only richer but also closer to the future than the poor nations All poor nations could and should do would be to imitate rich nations and follow them on their excursions into Future land
4 The basis for all this was to a large extent extrapolation based on the nations of today with time as independent variable and some measure of economic level as dependent variable The region on the latter between the poor and the rich in the present world was seen as the subject of development studies the region ahead of the rich nations as the subject of future studies That development and particularly future development might take completely new roads was not seriously considered and the dominance *relations* rather than the technical and economic *differences* between nations were not really studied either

This general perspective is served as pointed out by a methodology of future research that is predictive even trend oriented positive and basically optimistic singularist and elitist It becomes dangerous by giving intellectual and other types of power to elitist groups in elitist countries In general such groups would oppose any international organization of future research not firmly controlled by themselves Since only relatively rich countries would be able to support elites engaged in such relatively idle pursuits in the sense that it does not lead to any short run gains one would expect these elites to cluster in the rich nations

*For an illuminating discussion see Herman Schmid Politics and Peace Research *Journal of Peace Research* 1968 pp 217–232 For an effort to bring about a synthesis between old and new concepts in the field of peace research see Johan Galtung Violence Peace and Peace Research *Journal of Peace Research* 1969 pp 167–191



and to use (or be used) by the inter governmental organizations of rich countries OECD Council of Europe NATO and EEC For the elite in the elite nations the future is not seen in terms of dramatic change or designs for something basically new—for the simple reason that seen from the top the world does not appear to be basically bad or wrong Hence future research becomes a concern with small details with quantitative changes within a given frame and for this purpose professionalism is useful It is also incidentally useful for social scientists since they feel they have been overshadowed for much too long a time by their natural science colleagues who deal with processes with quicker change rates than social scientists focus on Only by bringing in the future can the social scientists get time spans that are action relevant enough to make the social scientists themselves fully relevant

## SOME SUGGESTIONS FOR THE ORGANIZATION OF FUTURE RESEARCH

What then does all this lead to in terms of suggestions for organizing future research? Faced with the three requirements of avoiding elitism in organization avoiding colonization of future generations and avoiding traditionalism in organization? It is certainly not an easy question for everything points in the direction of doing the easy thing

1 Limit participation in future research to professionals i e to people who are already trained in an already existing profession and in addition profess interest in future research
2 Use the mechanisms of scientific research to steer an association of future researchers towards some kind of consensus as to what the future will be/should be passing resolutions etc and in general pontificating on the future by setting itself up as an oracle
3 Organize national groups that come together in an international organization with headquarters in the north western corner of the world and as usual with north western predominance where membership and leadership are concerned with biannual conferences documentation service and so on

Let us therefore suggest some variations of these three themes as a minimum departure from this traditional and in our mind detrimental line For this is not only a question concerning some people who call themselves future researchers but a much wider group—precisely because future research by its very nature must belong to all of us

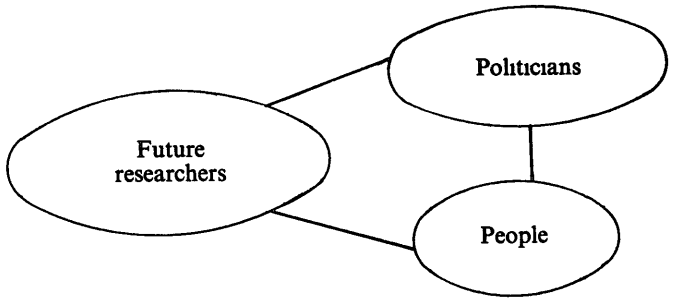
As to *participation* it is not obvious that any restriction at all is needed People interested in politics can join political parties those interested in arts can join art societies so why should we not have open future research societies without any qualification ? Qualifications are usually defined so as to conform with the self images of the leadership they cannot possibly lay down criteria they would fail to satisfy themselves If their own specialty is economic or technological forecasting the tendency will be to define future research in these terms if the specialty is more in the field of the softer social sciences and the humanities future research comes out as more speculative and artistic Inciden

tally soft is often a dysphemism for what can also be put in terms of openness for fundamental debate for basic criticism etc just as much as hard is a euphemism for rigid and beyond fundamental debate Fortunately future researchers do not have to be that limited There is an opening for professionals who are more concerned with creating new realities as well as predicting from the old such as architects and engineers And there is openness for people in the human sciences and for artists particularly in the field of science fiction as well as from the natural sciences although much less participation than there should be

All this openness is to the good but two rather important categories are still conspicuously absent *politicians* and *people* just people in general Why is this? Probably mainly because *future researchers define both as clients rather than colleagues* Future researchers want somehow to be suspended between the two giving advice to the politicians and education to the masses They may also use one against the other e g stimulate the masses until they are sufficiently agitated to exercise pressure on the politicians or advice the politicians on how to manipulate the masses—in the true manner of most professional groups in our modern societies

Then there is also a third possibility that politicians and people in general might join forces to relegate future researchers to more modest positions In view of this possibility usually not considered by future researchers organization and social forecasting is ever more needed simply as a strategy for survival

But instead of accepting this triadic model




with all its channels of communication and possible alliance formation we would rather argue in favor of breaking the triad by opening the citadels of future research for either group and not only as an audience to be lectured at or as clients but as full participants If there is lack of communication if they do not understand the future visions drawn for them by the specialists then there is something wrong with people or politicians And in general it seems rather likely that future researchers will have more to learn from imaginative politicians than vice versa

As to the second problem to *avoid colonization of future generations* we have already said that this cannot be solved by organization alone for the simple reason that whatever we do future generations will not be present and able to



voice their protests and demands For that reason it has to be built into the how rather than the who of future research And there is no need here to repeat the arguments in favor of genuine pluralism as a basic orientation in future research and how that leads to an emphasis on prescriptive future research and the tendency to see predictive future research more as a tool which also has important implications for the look out institutions Rovert Jungk argues so convincingly for

Then there is the third problem of *avoiding traditionalism in organization* Here is one list of not very imaginative suggestions that nevertheless may be politically meaningful in the contemporary world

1 *A World Future Studies Association* is formed WFSA This association is open for anybody who wants to be member Members can be individuals national associations other international associations organizations like universities and industries any unit any actor that wants to join Since the units are not necessarily national associations it should be called a *world* and not an international association Similarly studies has been preferred to research to avoid any term that steers thinking towards traditional empirical research
2 Individual members pay a nominal fee say $1 per year to make it as open as possible corporate members pay on an ascending scale depending on number of members
3 Basic decision making is made by direct democracy at general conferences according to the principle each individual present one vote Registration fees distribute the financial burdens more in the direction of those who really participate and away from non participant corporate (or individual) members—and the latter cannot participate in decisions
4 The association runs a newsletter and a documentation service preferably in a decentralized fashion by delegating these tasks to already existing organizations (e g newsletter to the Japan Future Research Association and documentation to the Futuribles)
5 To ensure good and universal contact with the *world of nations* WFSA applies for contact with UNESCO as an NGO with consultative status and as a possible recipient of funds from UNESCO It is very important that future research is organized in a context of the most universal organization possible, not in the context of the organizations for the rich Western nations *only* At the same time no effort is spared to try to establish contact with what is possibly the most future oriented of all nations the People s Republic of China
6 To ensure good contact with the *world of social science organizations* WFSA could apply for membership in the International Social Science Council
7 To avoid or at least to counteract the usual bias in favor of rich and Western nations the headquarters and the staff should be located in and to a large extent be recruited from nations outside that region
8 In general the center of the association should be weak and decentralization should be encouraged It should always be remembered that the stronger it tries to be the more will the membership be limited
9 The association should not be elitist in the usual sense of getting big

names in all possible and impossible positions Big names should be on tap rather than on top

10 The association should not try to monopolize international future research There are many world and international future research organizations and that trend should be encouraged among other reasons because national future research organizations are increasingly unrealistic in a shrinking world The future of any nation will be inextricably tied to the world system But at the same time there is also a need for organizations that are global and unbiased enough to make it possible for future researchers to use it as an umbrella under which they can all meet

Let us then add to this list some *less conventional* suggestions

1 Future researchers should work for an extension of the concept of *human rights* in a very important direction the right to *practice* not only to *express* alternative conceptions of how social life should be organized This is not the same as the right for everybody to compete for power in one nation state but the right for everybody to engage in small scale experimentation in social life

2 Future researchers should be encouraged to and assisted in *living* their futures not only *writing* them There are many ways in which this can be done organizing meetings as practicenses rather than conferences where one practices rather than confers systematic use of vacations sabbatical years etc for experiments in social living search for new forms in exhibiting and displaying possible futures and so on

3 Future researchers should try to act systematically as a defensorate for future generations much as historians have pleaded respect for past organizations and anthropologists for other peoples They should systematically watch out for developments that may enslave future generations by giving them less freedom of choice and in so doing should be a bad conscience for the present generation

4 Future researchers should experiment with new forms of transnational communication e g by having a tele satellite system that would transmit on a global basis a *Channel of the Future* with an effort to establish a global dialogue about the future

5 Future researchers should work for increased future consciousness by trying to live up to the challenge of somehow bringing material about the future into the institutions of primary secondary and tertiary level education This should not be seen as a problem of institutional rigidities in the educational system these rigidities no doubt exist but of whether we have material that is good enough

Much more could be added but we let this do as an indication in the hope of stimulating more proposals of the same type

## CONCLUSION

Reading through these lines we are painfully aware of some of the short comings The whole way of thinking is probably still highly colored by assumptions held by the self proclaimed social science elite in the north western corner of the world And why use such terms as intra paradigmatic when one is at the same time arguing the virtue of being able to step outside technical jargon Answer because of inability to do otherwise Others will have to point out biases unknown to the author others will have to find less elitist ways of communicating—if they can



For *ars longa vita breve* is more true here than for any other type of intellectual pursuit We will never arrive at *the* answer about the future it will always be a dialogue about what *may* be All we know is that the future will eventually become present with a new future ahead of it And that it is our task to help it come into being to serve the needs of all of us

# FORWARD-LOOKING TODAY AND TOMORROW

BERTRAND DE JOUVENEL
*President Fondateur Futuribles Association Internationale*

Timely indeed is the Kyoto Conference coming after the decade of the Sixties which has seen a prodigious increase both in the number of practitioners of forward looking and in the favor shown to such intellectual activity by the general public and by governmental agencies

A major gathering of such practitioners then offers an exceptional opportunity to take stock of this activity of its present distribution throughout the social field to consider the various objects to which it applies and the various roles that are played

Beyond such *de facto* self knowledge the practitioners will presumably want to assess their social function and the nature of their art and how far they agree—or possibly disagree—thereupon This is of no mean importance to the future of their activities

## I

The obvious bond between the conferees is that they look to the unseen that their attention is addressed beyond ascertainable facts or states of affairs to potential descendants thereof probable or contrivable But speculative attention may be addressed to any of an unlimited variety of *future* let me illustrate by means of the following jumble the diffusion of a new material (e g titanium) of a new practice (e g kidnaping) of a new idea (e g participation) the evolution of the Catholic Church of the Teamsters Union of I B M changes in buying power in ways of life in directions of spending in the structure and hierarchy of occupations alterations in the climate of international relations of domestic politics in the character and modes of action of pressure groups etc etc

Cutting through this unlimited variety of themes we have a limited variety of positions occupied and roles played by let us say for short futurists

At one extremity we have authors who address to the general public embracing frescoes of the future in the sketching of which their own hopes and fears play important roles and the response to which by the public is revealing of states of mind This dialogue between authors and public has a considerable influence upon opinion Obviously if the pictures drawn are rosy they tend to reassure if the contrary (such as Orwell s) they tend to alarm The former are in effect an

opium of the people the latter induce the people to take a hand in altering course But how to take a hand and how to alter course are unanswered ques tions

At the other extremity we have in house experts operating in an advisory capacity for powerful decision making agencies private or governmental Their primordial role is to indicate a presently probable course of things in a realm relevant to the responsibilities of the decision makers For the agency addressed this presently probable course may have the character of a dominant future (i e the agency is powerless to change it) In which case it is a warning that the actions of the agency should be adjusted to this course to make the best of it for its specific concerns so to speak to ride the wave instead of suffering its impact This in general will be the case for firms not for public authorities The latter have a wider responsibility and they have wider means therefore a foreseen course dominant for lesser powers is alterable by adequate action on their part

Therefrom arises the question what corrective or improving actions are apt to generate what desirable alterations at what cost with what degree of like lihood?

This is far the most interesting—in intellectual terms—and the most useful in social terms—of the endeavors of expects in forward looking It is if—and only if—we attend to work of this kind that we can improve our competence and perform our social function

Before developing this theme however it is proper to note that in house experts serving as auxiliaries to a given Authority are limited in the scope of the recommendations they can utter by the receptivity of those whom they address This is a constraint on utterance from which independent experts are freed say those with an academic basis

Their being freed from this specific constraint however does not allow them to indulge in an intellectual joy ride Beyond the constraints due to power holders are those which depend upon social behavior Those constraints the imaginative planner would come up against if he could dispense with the political leaders and sit himself in the seat of power Even should he resort to authoritarianism with its most powerful instrument opinion control only part of these constraints can be broken down

For this reason it seems to me that the contrast between the predictive and the normative attitude should not be pressed too far Even if circumstances afford to the imaginative planner perfect freedom to adopt measures embodying his collective preference function he must do some predictive work upon the reception and outcome of the measures which come to his mind There can be no intervention or planning which does not imply a considerable resort to prediction But let me on the other hand stress that the art of prediction can make no progress if not married to a purpose of affecting courses

## II

There is a widespread and growing demand for Prediction That is readily understandable Parents are aware that their children now young shall start their adult life in a setting very different from that familiar to the parents and



these therefore are eager for some Guidebook of the City to be into which their children shall as adults so to speak immigrate towards which the mere passage of years causes them to be carried Indeed while this concern for the future of the children—which has ever been the deepest social motive—calls for Prediction the adults have also concern for themselves they see the familiar landscape crumbling around them and are anxious for guide posts whereby to orient themselves anew

Anyone who has been presented to some public as involved in futures research has had the experience of being asked a volley of questions which are of the same character as those posed to a traveller returned from some little known country by those who envisage a visit to it The difference of course lies in that the futurist has not in fact visited the City to be But he is urged to speak as if he did have factual knowledge thereof It is regarded by his questioners as a form of escape if he stresses that the City is a building that its traits are being cumula tively set up by human actions including those of his questioners The latter are not prone to believe that they have any discretion in the making of the future a disbelief understandable in view of the paltriness of our individual forces and means

A similar point was made by Rousseau more than two centuries ago in a different context As counter part to the necessary subjection of the individual to the Laws of the City (the analogy is with his being perforce exposed to what shall have become the Present) Rousseau stressed the individual s share of sovereignty in the making of Laws (the analogy is his share in inventing the Future as Gabor put it) but he noted that credibility and value of this share vanished away with growing numbers which indeed brought in its train a con centration of decision making and a distancing thereof from the individual Such phenomena give our contemporaries ample reason to regard the Future as shaped by forces beyond them and powers above them And therefore what they demand is Knowledge of the Future which obviously can be no more than a substitute for Knowledge call it quasi Knowledge

But even important decision makers demand quasi Knowledge Wishing to make their decision on the basis of facts they call for *quasifacts* to figure in their calculations

Nothing is more natural than this demand for quasi Knowledge of the future As we know it obtained in Babylon and ancient Egypt where incidentally the answers of the seers were reserved to the rulers

But while decision makers are avid for quasi information as an input in their decision making they seldom welcome any interference in this decision making

The student of change may be asked one of three questions by a decision maker

1 What is the likely course of events in the field of interest to me?
2 What is the likely outcome of a certain action I contemplate in view of the previous likelihood?
3 What are the various policies which circumstances make worthy of exami nation and what the expectations of advantages and costs of each?

When answering the first question the expert acts as an informer when answering the second as an estimator if asked the third he is in the role of strategic adviser

It is a fact of experience that power holders are very willing to ask the first question reluctant to ask the second and will ask the third only of one who is very much their man and in strictest confidence

Obviously we are interested in dealing with the third question and in so doing openly and publicly This however entails two problems one of an institutional nature how can the survey of possible policies and their expectations of outcomes be offerred to the public? The other problem is of a more fundamental character how can we develop the capacity to perform such a function competently?

These two problems call for the most serious attention

## III

Easy is our agreement on the requirement that the public should be made aware of alternative feasible futures Democracy was deemed by its classics to consist essentially in popular control over the making of laws generating rights and obligations In our day policies generating concrete results have become of supreme importance Everybody feels that policies programmed to develop over time and to produce their effects over time are different in nature from the executive actions of a former period It then seems natural that we should want to extend the control of the governed to policies

But there is a great difference between policies and laws laws at least in their older sense generate rights and obligations which are certain The public can choose on the basis of rightness Policies generate results that are uncertain They can not be chosen on the basis of results and costs taken for certain The results may fall far short of the desired results and may comprise undesired and unforeseen results A famous instance is of course the policy of Prohibition given the form of law Indeed this instance raises the question whether it is wise to give the form of law to what is in essence a policy to be justified by the social outcome

Taking present decisions in consideration of the expected effect upon Society is pragmatism There is no work implied in uttering a judgment upon a decision on the basis of immediate preferences (ethical or other) but there is work implied in forming a judgment upon a decision in consideration of its likely outcome

Early in the Sixties I advanced the idea of a Surmising Forum an Exchange to which forward lookers would bring their surmises of various origins and characters and from which policy preparators could make up their advocacies of various courses or their differing estimates of a proposed course

For this second stage what I had in mind was much like the hearings before a Congressional subcommittee and even more like the hearings before a jury

As I explained elsewhere this procedure involves a super position of likelihood judgments besides the value judgments which are inherent in political choices That is the likelihoods attached severally by the jurymen to the several expert testimonies themselves involving the likelihoods attached by the several experts to the specific surmises by them utilised

Another and more obvious problem is that of retaining the attention of jury men There is a clear danger that assiduity will be restricted to direct representatives of specific interests immediately affected It is moreover a common experience that even policies to the formation of which *ex ante* participation was invited are apt to arouse strong *ex post* reactions



It is idle to say more as we come to touch upon the well known political problem of our time as structures tend to concentration contestation becomes the rising alternative to participation

In such circumstances it is of enormous importance that forward lookers should raise their voice for the dumb and loudly announce to rulers the discontents they shall in time arouse This again poses institutional questions

Unquestionably the relationship between forward lookers and power holders pose problems forwardists who address themselves to some Establishment are seen as part of it by the outsider while in fact non partners in the decision made

## IV

But I must move on to another problem The more ambitiously we conceive the social function of forward lookers the more carefully we must examine our capacities

And the question arises how far are our capacities to foresee probable changes or show the way to feasible changes specific to us as forward lookers ?

To answer this question let me take a realm of forecasting and planning which is quite familiar to me economic forecasting and planning It is immediately evident that the very expression of an economic forecast or plan is couched in terms specific to Economics and that the very structures of the hypotheses are based upon relations known to economists as such between categories of phenomena studied by their discipline or made up as categories by this discipline

So what does the forward looker as such bring to economic forecasting and planning? Nothing but his purpose But that is something of decisive importance

The science of Economics had reached before World War One what seemed to be complete maturity Its Grand Theory was all embracing and satisfied the mind by its logical coherence Nothing was lacking therein except the ability to forecast the Great Depression and except the ability to indicate remedies The scandal of the Great Depression inspired a purpose to manage the economy for full employment and uninterupted growth This lead to selecting out of the complex system the main factors which seem operational in terms of employment and growth This led to macro economics national accounting input output tables dynamic models and generally as noted by Shackle the injection of the Time element Today of course forward looking is entirely dependent upon economic knowledge but the economic knowledge upon which it depends is one which has been deeply recast by the purpose of looking forward And this instance shows as it seems to me the fertile provocativeness of the forward looking attitude

Let me repeat as this seems to me of capital importance to the placing of futures research While our conjectures and designs must be based upon material afforded by our social sciences yet our social sciences have to be moved forward by our concern It is not to be expected that a discipline insensitive to concern for the future can here and now afford useful tools But more than this taking

Economics as the outstanding example of a discipline which has been trans formed by a concern for the future it must again undergo a further transforma tion to face a forward looking concern different in nature from that to which it adjusted I refer of course to the newly born awareness of environmental deterio ration There was no place in economic calculus for negative outputs the science must now be responsive to the concern they arouse

Some twelve years ago Ely Devons wrote a paper which make a great stir but the significance of which is understood only progressively It was called Applied Economics? The application of What? The author contrasted the teaching of Economics which had been his life work and giving of economic advice to Government or Industry for which he had been often called This confrontation brought him to the statement that only a small part of present theory is enlighten ing and usable A statement which immediately suggests that the more you shall solicit a discipline for purposes of action the more shall theory grow in direc tions making it of social service while the less you shall solicit the discipline the more shall theory mushroom into sophisticated irrelevance

If so the relationship between forward looking the social sciences and Society comes out clearly A Society can not have the social sciences capable of lighting up its progress unless the purpose of looking forward inspires and informs these sciences

## V

Our purpose is not to stir up men s hopes but to guide their travels This saying of Francis Bacon (in *Valerius Terminus*) is to me the ideal definition of our social function and ideal motto for our guild

The expression men s travels evokes the likening of social history to the march of a caravan Saint Simon s metaphor (in *L Organisateur*) This metaphor can be used to distinguish the problems raised on behalf of those who get left behind in the march (welfare problems in the American use of the word) or concerning the spread between the marchers (inequality problems) the difficulty or ease of moving from nether to advanced ranks (Pareto s circulation of elites) and finally concern with the very direction of the march (as the young are increasingly asking is this the civilization we want?)

Furthermore this image of marching calls to mind the expression of Hobbes (in *Leviathan*) who calls thoughts scouts to range abroad and find ways to things desired and he should have added to give notice of obstacles and dangers

These images seem to me suggestive The caravan image corresponds to a social system that is dynamic but also inhabited by powerful inherent inertias One form of social forecasting which has wide currency is to estimate future situations and states of the caravan at successive future dates Such estimates are based upon an analysis of the system itself based upon the previously noticed which in turn implied a judgment as to what was worthy of notice The basis therefore lies in objective relationships and subjective judgments belonging to the past

This is a pretty pedestrian exercise but not useless It is useful if used not as a final product but a means of finding out what would be the nuisances and deficiencies attending the mere pursuit of an experienced progress It is for no other purpose that the French 1985 Group (operating in 1962 and 1963) used a 1985 puppet



If we now turn to the scouting image what it evokes is a ceaseless signalling of new facts new attitudes precisely all that is systematically excluded from the other approach Note that what the scout signals are not futures guessed at but phenomena which are to be seen already present Present however so minutely that they escape the sieve of statistics or present in a manner which may seem incidental The foresightful part of the scouting then lies in recognition of potential importance a potential which may be actualized in different ways by natural diffusion in permeable parts of the body social or by deliberate decisions of competent authorities or concern both coincidentally or antagonistically

Such a signalling system operates in many realms for instance the alarm sounded about the birth of monstrous babies travelled with great speed to those capable of arresting the diffusion of this awful evil or notice of the com puter propagated to those capable of availing themselves thereof In the realm of social and political novelties there seems to obtain no such rapidity of com munication and reaction

It seems therefore desirable to establish reception stations for such signals one of which is now being set in Paris by Futuribles Meetings can then be dealt for the assessment of the signals involving those who might or should act upon them

## VI

Now what can people so differently engaged have in common? Clearly not a science indeed they are denizens of very different disciplines and when Professor Nieburger of U C L A makes his impressive case regarding the travels and cumulation of deleterious substances in the atmosphere he draws upon knowl edge of which I have no share

So what we have in common intellectually is at best an art I say intellectually because I feel that we are morally bound by a sense of responsibility to the generation that is to come after us

An art This art I have called the Art of Conjecture This has been regarded as far too unassuming a name But I remain wedded to the term because I find it descriptive of the actual operations of the mind as experienced on contribut ing forward looking views to decision makers Let me put this in the first person

It is because I foresee a bad course of events that I feel the necessity for some corrective action and thus stress that there is occasion for a decision

If a meeting then occurs at which a certain action is proposed I try to foresee its possible consequences and if these seem to me bad or unsatisfactory then I cast about for some action which shall bear more desirable consequences In all three stages foreseeing a bad course working out the poor consequences of the proposed action imagining alternative actions and their possible con sequences I am engaged in building sequences of events this is a creative work of the mind It is only after such work has been done that its fruits can be worked

into the classical table of decision theory I would indeed discuss further the suitability of the latter but the main point is that it can at best serve as a mode of presentation to decision makers of the work done by the forward looker

Now how can we develop the skill for this work? As in the case of every skill it is developed by practice This is not an expression of indifference to method Indeed in the early years of Futuribles from 1961 to 1965 we had no less than four international symposia on methods but these were mostly an exchange of experiences between people who had experience and it was what Eric Jantsch would call a process of technological transfers

I happen to have been for the last four years Professor of Social Perspective at the Paris Faculty of Law & Economics and I find myself this year in charge of two hundred graduates in Economics or Political Science As it seems to me their needs are best served by a) acquiring knowledge of the procedures which have been used or are being developed in various fields b) trying their hand individually and autonomously at building the conjectures suitable to prepare decision making in the case of some specific problem of the real world Definitely not what I would call a schoolboy problem that is one the terms of which have been defined by the teacher

I thoroughly distrust made up problems that is where all the information to be taken into account is given and where the structural relations are definite This is a teacher s world not the world in which men will have to take deci sions Operating in the real world they will have to decide what aspects thereof are relevant to the problem they attach They will have to weigh the value to their purpose of statistics which have been collected in most cases for quite differ ent ends and indeed the validity of averages when one is dealing with change the germs of which are rarely to be found in modal behavior In most cases the information desirable shall not be available and it is a practical problem such as we all the time face, to find some acceptable representatives for the informa tion lacking

Obviously the problem chosen must have some sufficient proximity to the student to enable him to work out around it the exogeneities to be taken into account It must assuredly not be some vast far flung problem of which he can take no personal cognizance

I do not want to prolong this but it serves to illustrate my deep conviction that the progress of our art requires deep involvement with reality—the condition of every scientific approach—as against playing with simplified representations which I regard as the highway to delusion

It is a sense of social responsibility which initially moved us to be forward lookers As social belief rises in response awareness of responsibility arises in a new form If this is going to be received it behooves us to perform better than we yet know how

# THE SCIENTIFIC BASIS OF FUTUROLOGY AND ITS MAJOR TASK

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## I THE THIRD CATEGORY OF SOCIAL SCIENCE

Futurology is a newly rising discipline in social science Accordingly there is a serious question whether it is possible to be an established science or not For it is neither a science of facts of past or present nor a philosophy of pure logical system of the world

In my view futurology is a third category of social science which I call theoretic science According to my opinion theoretic science means a synthesis of science and philosophy reality and ideal causality and teleology Such theoretic sciences may indicate the new image of future society and principles of social planning and policies

In truth can we find various kinds of theoretic science?

Theoretical sociology like those of K Mannheim s Systematic Sociology and of P A Sorokin s Social Philosophies of an Age of Crisis

Theoretical Politics like those of H J Laski s The State in Theory and Prac tice E H Carr s New Society of The Twenty Years Crisis and D Easton s Political System

Theoretical economics like those of J M Keynes The general Theory of Employment Interest and Money or The End of Laissez Faire and G Myrdal s Beyond the Welfare State For instances of their theories

J M Keynes the ideal commonwealth as the theory of economic growth in his General Theory (p 374)

G Myrdal s The democratic Welfare World as an international ideal in his Beyond the Welfare State (pp 165–8)

H J Laski s the competition of ideals in his evolutional theory of history (The State p 119)

P A Sorokin s the integral cognition as the third way of cognition

S Webb s the age of the new synthesis after the disintegration of the old synthesis in his Fabian Essay

N Sombart says the great synthesis is planning theory and future science at the same time (Krise and Planung S 67)

The authors referred above I believe devote to formulate methods or scientific theories in their respective way Therefore it may be said that the theoretic sciences with such meaning give a new scientific basis to the futurology distinctive from religion or utopia in the field of social science At the same time the theoretic science of this kind I understand is to be distinct from policy making which belongs to the field of social engineering

In this meaning policy making I understand is the making of a concrete design for social reforms or the administrative measures to put the philosophical principle or the general principle of law into practice in particular cases

In my view theoretic science may prescribe the future image of human life of society by the following method

Scientific analysis—theoretical criticism—higher rational synthesis

The first mode means pure scientific operation The second is logical criticism to find some contradictions or deficits in facts or realities the third is a higher synthesis according to principles of philosophy to exclude contradictions in realities and formulate a new image of future world

My view of theoretic science is I think near to that of K R Popper s the theoretical social sciences in his The Poverty of Historicism which recognizes the important role of philosophy in social science

In such a meaning philosophy is a synthetic and logical system of world view which formulates an ideal image of society and state and indicates principles of social planning and policies in concrete The philosophy of this kind is to be distinct from the paradise of religion or a utopia which are not necessary to be logical nor indicate practicable principles of their realization in the real world

In conclusion there is the question whether the prediction of social trend in society is to be judged or measured by the same variables with the forecasting of the weather in natural world or not Speaking plainly variables of them are not the same At least we may say the weather is changed mainly by the causality of natural law on the contrary social trend will be decided by the compound operation of causality and teleology

In consequence the prediction or forecasting of social change seems to be more difficult than that of natural affairs Moreover in variable elements of social change the causality itself is not necessary certain nor definite and the teleological elements are of very complexity Among them we find many factors feeling want expectation ideal ideology and other motives of human mind Therefore the probability of social prediction is to be depend on the more higher development of precise science

## II CHARACTERISTICS OF THE NEW STAGE IN WORLD HISTORY

In general the processes of human history are interpreted to have taken several stages of development This view will be admitted by many of the evolutional theory of history in a broad meaning Roughly speaking may we find four stages of history as follows



The Primitive the Ancient the Mediaeval and the Modern

The demarcation of these historical stages may be I think derived from the comparative study of the works of many prominent historians Among them Hegel s idealistic interpretation of history with a dialectic method Comte s evolutional theory of three stages of intellect as theological metaphysical and positive Marx s materialistic interpretation of history as history of class struggle and so on

Now there is a serious question whether our present time is to be interpreted as a new stage of world history distinctive from the modern time or not

In regard to this problem we find various opinions But in this case avoiding discussion about the problem I should like to state my opinion briefly I take a standpoint making a distinction between the modern time and the present

Comparing characteristics of the present time with those of the modern we find several distinctions as follows

| | The Modern | The Present |
|---|---|---|
| 1 | The age of the first industrial revolution from the light industry to heavy and chemical industries | The second industrial revolution the postirdustrial society and the age of high mass consumption |
| 2 | The system of capitalistic free enterprise the age of unplanned competition and the occurrence of periodic economic depression | The system of mixed economy with variety of economic systems the age of planned and controlled economy in private and public sectors in order to attain the continuous economic growth |
| 3 | The age of bourgeois democracy the system of limited suffrage and the government of bourgeois parties in the main | The age of mass democracy with planned policies the popular sovereignty with the system of universal suffrage |
| 4 | The age of bourgeois society modern industrial civilization and the night watch state | The age of mass society the community of mass civilization and the welfare state |
| 5 | The nation state and imperialism from nationalism to imperialism | The age of true international community from the United Nations to a world federation and the democratic welfare world |

Such characteristics of the present time found their inception at the end of the first World War in this century and have developed themselves definitely more and more with the second World War the emergence of atomic bombs the Organization of The United Nations and the successive independence of developing countries in Asia Africa and Latin America

Concerning the interpretation of history I do not take simple materialism nor idealism For both of them are one sided view to see only one side of truth in history According to materialism matter determines monistically the process of history in consequence it can not recognize the creativity and planned activity of spirit On the contrary simple idealism asserts too far the absolute value and almighty of spirit without understanding the true nature or just function of matter in human life and history

Then I take the pluralist interpretation of history for granted to be true

and scientific In my view of history human history proceeds its course of evolu tion or progress by the interaction among three factors material or economic spiritual or cultural and political in the main Generally speaking in the historical process in the first the change of economic life including a certain technical innovation arises in the second the cultural revolution including the renovation of science and ideas takes place in the third when new ideas or philosophies formulate the new image and logical system of society and indicate the new principle of politics and social planning then organized political movements for reform or revolution of the old world occur with them

Among these factors the political factor takes the most important role when the above mentioned social change has reached at its climax to outbreak a drastic political change Then the organized political power taking the leadership of all national movements for social change takes decisive action to form a new government in place of old one in order to establish new social order in the first Next the new government enacting the new system of laws with a new con stitution decides various kinds of fundamental policies for the new state and enables the new society to advance a progressive course of the new line of life in accordance with higher principles of community

These are the political role when a decisive social change takes place though may the intensity and method of the change be full of variety in accordance with time and place

## III THE MAJOR TASK OF FUTUROLOGY

The task of futurology with the above mentioned method is to formulate the model of future society or human world and the planning theory or principles of policy in accordance with the characteristics of the new stage of world history In the concrete can we find three problems as follows

The first is the formation of mass society based on the principle of social equality This means that the present world evolutes from class society to classless society At least it may be said that the present tends to abolish distinctions or discriminations derived from race sex religion birth job or profession in principle and institutions though are there much distinction in property or income among individuals or groups in economic life

In other words in the present world the great mass of people with few excep tion is becoming the working mass whether they have small property or not In reality various kinds of population from laborers in factory or farm to retailers small workshop owners including many white collars tend to belong to the working mass Thus has this great mass occupied the overwhelming majority of population in society In consequence mass society of actual working people has raised itself on the foreground in the present world

Thus many problems about mass society have been raised as follows

The tendency of rapid urbanization of great mass of the population with many evils and public nuisance
The reappreciation of mass civilization
Mass communication and scientific information
Literature of mass society



Problems of mass education
Mass democracy

Among these problems the foremost is politics of mass society According to my view political science means public socio contrology Therefore politics is the public function of the state with a law system and public power contribute to form and develop the nation and international community through its rational and planned control

The main task of government in a mass society may be enumerated as follows

1 The complete democratization of mass society including the combination of representative forms of government with a direct democracy holding a certain form of plebiscite system based on the popular sovereignty

2 The driving of planned democracy to raise the higher development of the standard of living both economic and cultural in mass society

3 The functional change of the state from a negative or inactive state to the positive or active one from a nightwatch state to a service state or welfare state

4 The transformation of the nature of state from a class state to a com monwealth based on principles of equality or justice in all fields of social life that is the formation of a democratic community

The second major task of futurology is to recognize that the present is the age of socialization in its broad meaning It involves the problem whether the long term continuation of economic growth and the building of welfare community can be reached at the same time or not

This contains the problems the high mass production of economic goods and services and the creation of high mass culture to be fostered on the one hand and the broad socialization of economic and cultural values including their just distribution on the other

About this concern there are two questions The one is the question that the continued economic growth will be possible without great depression owing to overproduction

Even today there is no proof that any destructive great depression will not occur without the effective planning of international economy put into practice But I commit the matter to the care of distinguished economists of theoretic economics and econometrics

As a political scientist I prefer to indicate that the establishment of the welfare state is becoming one of the most important task in the world at present

To tell the truth now the problem of the welfare state is prevailing as a univer sal task in every field of social science and practical politics from the capitalist world to the socialist one as well though their principle and policy are full of variety

For instance E H Carr in his New Society says the present time on the road of proceeding from the nightwatch state to the welfare state that is from the state of Laissez Faire to the state of social service

D C Marsh says in the Preface of his The Future of the Welfare State

> The phrase of Welfare State epitomized for many of us the kind of society we hoped to see established very different from that of 1920s and 1930s and worth fighting for to achieve a greater measure of social justice for all

This suggests that the phrase of Welfare State has come to the foreground as an epitome of new society after the second World War and it means a greater measure of social justice for all in its essence

According to my view the welfare state being a teleological view of the state means to help the creation of economic and cultural values and the just distribu tion of such values for the welfare of all people and the human world In short it means a higher synthesis of economic community and cultural community as the comprehensive and integral purpose of the state

In the practical field of policy from the security of the right to live to various kinds of social insurance social and cultural services or reformed educational institutions for mass society Thus it may be said that the policy of social welfare includes almost of all human well being

## IV FUTUROLOGY AND THE ROLE OF THE THIRD WORLD

The third is to realize the true and real internationalism of the present time which is the most important among the rest It means the keen need to establish a world federation with a world constitution and the democratic Welfare World as suggested by G Myrdal

As practical process of this concern I enumerate several tasks of international politics as follows

1 The amendment of Charter of the United Nations in order to form a world government with the executive under the General Assembly with the power of taxation upon the member states

2 As the question of the day granting the Secretary General more executive powers the functions of the Economic and Social Council the Unesco and other subordinate organizations or agencies are to be animated and their practicable recommendations to member states to be put into practise as soon as possible

3 The rational planning of international economy in the field of main peace industries with the policies for the expanding equilibrium of world economy to be put into practice in order to avoid economic panic or arms race

In the second place I have to indicate the rising new internationalism advo cated by the third world This new internationalism means what the third world of developing nations on the south of the earth stands up to seek the establish ment of new world order with a new international division of labor including the industrialization of their national economies clearing away many barriers between the north and the south to raise the standard of economic and cultural living of them to the higher level of international community Such is the es sential idea of new internationalism which the emerging countries of the third world brings forward for the world innovation

Such demands of the third world have been repidly manifested after several conferences and their declarations

Final Communique of the Asian African Conference 1955
Belgrade Declaration of 25 unaligned countries 1961
Final Act of UNCTAD 1964
Charter of Algiers 1967



Among these manifestos Charter of Algiers of the group of 77 nations is the most prominent in the Charter declares

> The international community has an obligation to rectify these unfavorable trends and to create conditions under which all nations can enjoy economic and social well being and have the means to develop their respective resources to enable their peoples to lead a life free from want and fear In a world of increasing interdependence peace progress and freedom are common and indivisible Consequently the development of developing countries will benefit the developed countries as well

This is the principal part of the Charter In principle it imposes upon the international community in general and the developed countries in particular an obligation to rectify international injustice and to assure economic and social well being for the peoples of the developing countries In other words this demand means the assertion of the third world to seek the basic reform of world order as their international right

Based on these principles the Charter enumerates international policies as follows

1 The global policies for development to be adopted as convergent measures of both developed and developing countries

2 A new and dynamic trade and development policy to be put into practical action

3 The stabilization of the price of primary products for the benefit of the developing countries

4 Trade liberation the open door policy for the output of the developing countries and a general system of preferences for the trade of products of the developing countries should be adopted by the developed countries

5 Development finance and technical assistance with the target of a mini mum 1 per cent of each developed countries Gross national product, and so forth

These policies or measures of course have to be put into practice by the primary responsibility of the developing countries with the co operation among them

Considering all these policies and their effective practice to have been taken how far would the national income and the standard of living be raised? In this connection I may cite a comparative prediction of the raised income among the nations of the world at the end of this century by Herman Kahn (*Toward the Year 2000* p 87)

| | | |
|---|---|---|
| 1 | The preindustrial | $50 to $200 per capita |
| 2 | Partially industrialized or transi tional | $200 to $600 per capita |
| 3 | Industrial | $600 to perhaps $1 500 per capita |
| 4 | Mass consumption or advanced industrial | perhaps $1 500 to something more than $4 000 per capita |
| 5 | Postindustrial | something over $4 000 to $16 000 per capita |

Comparing the annual income of the 1 group with that of the 5 group it seems too far to overcome the large gap between them Consequently as the

problem of the present day pessimistic outlooks arise among many observers

In fact the United States and USSR as advanced industrial state taking the lead of other high industrial states set about to increase trade and their economic aid including finance and technical assistance or even the offering of various aids for the development of the developing countries

But their aid or assistance is far beyond the reach of overcoming the gap between the developing countries and the developed

Therefore the decisive action has to be taken in order to correct the interna tional inequality or injustice and to establish the welfare world In concrete the construction of a world federation without war as above mentioned As practical policy a larger part of $200 billions of world military expenditure are to be al located for the economic aid and the development of the developing countries in the broad scale

Concerning the serious problem I cite the words of M K Gandhi and J Nehru Gandhi says

> What is true of families and communities is true of nations There is no reason to believe that there is one law for families and another for nations History as we know it is a record of the wars of the world If the story of the universe had commenced with wars not a man would have been found alive today (*Indian Home Rule* pp 85–86)

and Nehru says

> If our ideal is to be one of social equality and a world federation then perforce we must work for a socialist state (*Selected Writings of Jawaharlar Nehru* p 333)

These words are worthy of note as representative opinions of leading men among the emerging nations The one is the prospect of the peaceful world without war from the standpoint of world community the other asserts progres sive socialism in the domestic and a world federation in the international based on the principle of equality

Anyhow it may be said that the greatest task of futurology is not necessary depend upon the greatest state with the highest standard of living but rather on the shoulders of the third world of emerging countries

In such a meaning we must say that the future world is that of the third world and the next century is the century of the third world

In this connection I remind the words of Secretary General of the U N U Thant he says

> The U N is weak and inadequate today but it is the only hope for mankind to get out of the thermonuclear jungle and to a civilized world community

Keeping these words in their mind leaders and peoples of the third world have to exert with their majority power and aspirations in international politics to strengthen the structure of the U N and to construct a new peaceful world community

# SECTION 2

# RESEARCH METHODOLOGY

# FORECASTING METHODS IN THE SOCIAL SCIENCES

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## INTRODUCTION

In 1936 was published an interesting set of prophecies relating to 1960 [1] The most dramatic of these was the announcement that by 1960 work would be limited to three hours a day The author went on to present the following picture of life as it would be lived in 1960

> If we are to try and understand life as it will be led in 1960 we must begin by realizing that food clothing and shelter will cost as little as air Science has simply to learn to change cellulose into foodstuffs at a negligible expenditure of human energy and we shall eat as we breathe Science has only to go a few steps farther in mechanically producing textiles in factories where there is nothing to do but press a button and we shall dress as do the lilies of the field Society has only to have a strong enough control over the individual to limit population and there will be room for all rent free I do not say that such a state of affairs will be universal by 1960 but *it is the condition towards which we are inevitably trending* a condition wherein our ordinary notions of labour and the rewards of labour will alike be meaningless

Two years later the U S National Resources Committee published a major study wherein the total population of the United States was projected under the assumption of medium fertility and mortality and 100 000 net immigration per year after 1940 to reach 158 million by 1980 at which time it would have approached a state of equilibrium [2]

It is hardly necessary to belabor the obvious point that both the prophecies of Langdon Davies and the projections published by the U S National Resources Committee fell far wide of the mark By 1960 millions of workers were spending

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up to three hours per day merely moving to and from their jobs As for the notion that food clothing and shelter would cost as little as air we find by 1970 that breatheable air may soon cost as much as food clothing or shelter and the valiant efforts of our flower children notwithstanding we are by no means able to dress as do the lilies of the field Meanwhile the population of the United States displaying a lamentable indifference to the laws of logistic growth passed the 158 million mark less than 15 years after the above projection was issued is now approaching 210 million and continues to rise by about 2 million per year

These two outlook statements may be taken as fairly representative of the polar extremes of forecasting methods available to the social scientist At the one pole is the reasoned outlook statement heavily value laden whose insights are thinly disguised arguments in support of some particular panacea At the opposite pole stands the objective and technically sophisticated work of two outstanding demographers Warren S Thompson and Pascal K Whelpton whose projections of the population of the United States were adopted by the National Resources Committee as representing the most informed and careful investigation of probable future U S population growth [3]

There is much to be learned from these errant forecasts To begin with neither of them can be criticized as inconsistent with their underlying assumptions Langdon Davies perceived in the accelerating growth of science and the enor mous potential of its application to the problem of human want an inevitable trend toward the conditions he described When his outlook for 1960 is com pared with the current prognostications of a cybernated world it is apparent that many of the trends he recognized as nascent causes of a world free of want and labor are still being regarded a third of a century later as potential mainsprings of a transformed world Only the date of the beginning of this millenium keeps being advanced like a mirage on the horizon

The case of the Thompson Whelpton population projections is similarly defensible on the strength of the underlying assumptions Their analysis of past trends in mortality fertility and net migration to the United States together with their understandable confidence that these trends would continue to mani fest themselves provided a sound logical and empirical base for the projections they prepared For all the criticisms which have since been expressed of these and similar demographic projections it is difficult to imagine that any competent demographer given the same data and objective could have developed a radically different set of projections

Secondly it is sadly evident that neither the reasoned judgment of an insightful observer nor the refined techniques of the objective technician who works with masses of quantitative data can guarantee results which will meet the test of actu al historical developments The events of the past thirty years provide overwhelm ing evidence that the *least* likely outcome at least over any period beyond a few years is precisely the kind of surprise free outcome to which we are led either by imaginative extensions of perceived nascent causes or by extrapolations of past and current trends As Nisbet has caustically noted [4]

> What the future predictors the change analysts and trend tenders say in effect is that with the aid of institute resources computers linear programm ing etc they will deal with the kinds of change that are *not* the consequence of the Random Event, the Genius the Maniac and the Prophet To which I can only say there really aren t any not any worth looking at anyhow



Finally these two widely different approaches to the task of prognostication illustrate a common difficulty which impedes our efforts to develop improved forecasting methods our inability to identify the factor or factors which caused a given forecast to fall wide of the mark *Ex post facto* analysis readily brings forth a plethora of disturbances—unforeseen consequences of past decisions chance occurrences etc —which may have exerted a decisive influence in either altering the smooth trends on which a forecast may have been based or indeed in preserving them Furthermore the recognition of such disturbances is of little help in improving forecasting methods until and unless their probable impact can be measured and the likelihood of their occurrence in the future assessed For this reason the technician who seeks to improve his procedures by delving into the past to compare earlier forecasts with actual outcomes is likely to emerge a sadder but not necessarily a wiser forecaster

## TYPES OF OUTLOOK STATEMENT

Before considering a variety of forecasting methods in the social sciences it may be useful to introduce certain distinctions with respect to major types of outlook statement In particular we wish to distinguish among predictions projections and forecasts as a means of indicating both the range of purposes to be served by outlook statements and the technical limitations surrounding their development in the social sciences

**(1) Prediction**—To most social scientists the ability to predict systematically is the ultimate test of the achievement of scientific understanding Since this kind of prediction unlike the guess the hunch or the inspired intuition involves the application of a covering law to the phenomenon in question it is essen tially similar to explanation This similarity is well described in a recent study of social science research methods [5]

> explanation in terms of laws argues that prediction and explanation are simply different uses of the same schema In prediction we are said to be in possession both of the hypothesis and the statement of initial conditions from which the prediction claim is derivable In explanation on the contrary the explicandum (that which is being explained) is assumed to hold and we attempt to find the statements of initial conditions and the hypothesis which jointly entail it According to this view if we can justifiably predict that an event will occur then we can also give an explanation of why the event occurred The explanation and prediction are supported by exactly the same information i e the relevant generalization and the statement of initial conditions

Hempel has extended this symmetry thesis to cover functional analysis as well as nomological explanation By this extension the explanations of the functionalists may be used in prediction in precisely the same sense as the conventional explanations in terms of governing laws In either case according to Hempel explanations and predictions are essentially deductive arguments differing only in their temporal direction with respect to the explicandum

It follows from this line of reasoning that the search for covering laws or law like generalizations must be given first priority in pursuing both explanatory power and predictive ability and that these goals are inseparable Unfortunately the innumerable generalizations which abound in the social science literature offer little basis for the formulation of the kinds of covering laws which have proved useful in the physical sciences The complex interactions which characterize all but most trivial instances of social behavior the interplay of biological psychological and cultural determinants of that behavior our inability to identify isolate and measure the effects of even the major factors among these determinants and the halo of indeterminacy surrounding even the most straightforward measures and indices of social behavior or characteristics all of these limitations effectively guarantee that any generalizations arrived at are either sufficiently abstract as to have little explanatory or predictive significance or so specific and qualified as to apply only over a highly restricted domain

This does not mean that the search for systems whose functional elements display observable regularity through time is either misguided or hopeless But it does suggest that the task of developing useful and valid outlook statements should not be too closely identified with the more conventional tasks of scientific research Furthermore it is essential to recognize in the diverse purposes to be served by outlook statements a number of important needs which can be met quite apart from the search for scientific generalizations

**(2) Projections**—At first glance projections might simply be described as conditional predictions They typically display the same format an assumed system whose governing principles (or covering law) combined with a specified set of initial conditions provide a framework within which the future state of the phenomenon in question may be deduced The crucial difference between predictions and projections however consists in the factual status of their underlying conditions The typical If then form in which projections are expressed offers a clue to this difference The assumed determinants in a projection unlike those in a prediction need not reflect known causal relationships or factual governing principles In fact two of the most useful kinds of projections either require no profound understanding of the underlying processes and their determinants or else involve assumptions that are deliberately contrary to current reality The first and most familiar instance is the extrapolation of observed trends in some periodic measure of the phenomenon in question and the second is the heuristic projection of the consequences (logical or probable) of an assumed set of initial conditions which may be highly improbable or for which no real world instance is known Two brief examples may suffice as illustrations First the economic activity rates of a population group (i e the percentages of that group who are in the labor force either working or seeking work) may be projected into the future by extrapolating observed trends in these rates over time without specifying the covering laws which govern the propensities of the group to work Second the future distribution of a country s population among the several provinces states or districts of the country may be projected on the improbable assumption of zero net migration among these districts Such a projection when compared with actual population estimates at a future date provides an estimate of the impact of migratory streams on population distribution apart from the effects of natural increase in numbers



In the first case the extrapolations are naive in that the technician is working with a black box situation The rates he observes and extrapolates are obviously epiphenomenal but their determinants are hidden from view and are only partly understood at best In the second case a set of initial conditions is chosen for its heuristic value despite the fact that it is unlikely to be found in the real world

**(3) Forecasts**—According to our terminology a forecast is a projection which has been selected as representing the most likely outcome in situations which are not sufficiently deterministic (or whose determinants are insufficiently understood) to permit valid predictions Forecasts therefore serve as substitutes for outright predictions and must accordingly reflect realistic or plausible combinations of assumed determinants and initial conditions Where as is is commonly the case alternative projections cannot be assigned different probabilities of occurrence the selection of one of them as a forecast may be arbitrary In other instances the alternative projections may represent an attempt to delineate the upper and lower boundaries of a range of outcomes reflecting opposite extremes in the values of the assumed determinants so that a simple averaging procedure may yield an acceptable forecast

Following Jantsch it is useful to distinguish between two broad subgroups of projections and forecasts exploratory and normative [6] Exploratory (or heuristic) projections are designed to reveal the possible consequences of assumed sets of determinants and initial conditions which need not necessarily reflect the current situation Normative projections on the other hand are designed to delineate an optimal path from current reality toward a specified goal or target Although these forms of projection have been more thoroughly developed and investigated in the field of technological forecasting the following section will attempt to illustrate their potential usefulness in relation to the several forecasting methods available to the social scientist

## METHODS OF FORECASTING IN THE SOCIAL SCIENCES

Strictly speaking any outlook statement whether it merits designation as a prediction or is merely a projection forecast or outright prophecy is an extrapolation from our perception of the present In his provocative criticism of the current generation of outlook statements scenarios and the like Nisbet makes the trenchant observation that these efforts tell us very little about the future but are quite revealing about the present as perceived by these experts and social analysts through the filter of their adopted methodologies and values [7] This is a profound truth based on the sound epistemological principle that all knowledge of the past present and a fortiori future must take the form of ideal constructs whose components can only reflect the current state of our knowledge and whose selection and organization reflect current notions of relevance and scientific acceptability [8]

If then all outlook statements are in some sense extrapolations from the

present the remaining task is to outline and discuss the more promising methods whereby such extrapolations may be developed in the social sciences For exposi tory purposes these approaches may be classified in four broad groupings Qualitative exploratory Qualitative normative Quantitative exploratory and Quantitative normative [9]

**(1) Qualitative exploratory projections**—Three of Bell s modes of predic tion would seem to fall into this grouping Projections derived on the basis of the anticipated impact of a prime mover or those reflecting the assumed operation of some law of sequential development or those which take the form of scenarios of possible futures commonly share a concern with the possible consequences of an assumed set of determinants and initial conditions which cannot be fully expressed in quantitative terms As Massenet observes the search for nascent causes is a key feature of this type of exploratory exercise since the coherence of the resultant projection is heavily dependent upon the through time evolution of the key factors which are assumed to largely determine the character of the society in question [10]

The only research method which seems appropriate for this type of projection involves some combination of arm chair theorizing and a capacity to absorb large amounts of hard and soft data Most efforts in this direction have been the work of individual scholars only recently have such enterprises been carried out by small groups of researchers [11] Since this kind of research activity obviously places a high premium on both the expertise and the credibility of the individual researchers it is likely that qualified researchers will remain in short supply For this reason among others some adaptation of the Delphi tech nique merits serious consideration

The Delphi technique was developed initially for the purpose of pooling the informed opinions of selected panels of experts with respect to the likelihood and timing of the appearance of different technological items or developments currently envisioned but not yet realized [12] In its original form this procedure involves first the preparation of a questionnaire relating to the subject area of concern The questionnaire items may consist of any combination of codable materials—statements with which the panel experts may agree or disagree or questions which they can answer by choosing the most appropriate of the re sponses provided as in multiple choice examinations Some allowance for lengthier expressions of opinion may of course be made as well Next an appro priate panel of experts in the particular area of concern must be selected When the panel has received filled and returned their questionnaires the first phase of the operation has been completed In the second phase the returns of the first round are pooled coded and averaged and these results are circulated among the panel members In this phase panelists whose initial responses differed markedly from the group norm are asked to either modify their response or to provide a more elaborate defense of their position These responses are again pooled averaged and re distributed The cycle can be repeated as long as the process appears to yield significant changes in the expressed views

Two features of this technique would appear to warrant its adoption in social forecasting First it avoids the need to bring the experts together in a committee setting Second its reliance upon a readily coded schedule of items permits a



rapid and objective measure of the range and central tendency of the responses obtained Experience with the Delphi technique is rapidly accumulat ing particularly in connection with technological forecasting efforts where its chief value consists in what Hacke aptly terms delineating the boundaries of the possible [13] The advantages of the technique in addition to the welcome avoid ance of time consuming committee meetings include the avoidance of some of the distortions commonly associated with committee settings such as the spurious consensus obtained via the band wagon effect or the tendency to support the opinions of the more authoritative individuals or the tendency to adhere rigidly to previously expressed opinions because their later modification is thought to imply a lack of conviction or competence This technique may also reduce the distortions induced by the pressure of time which so often results in a last minute profusion of hasty decisions

The Delphi technique is not however free of dangers and limitations The initial selection of the panel of experts is both crucial and difficult Persons who enjoy the highest professional status in a given field may be fully in tune with the present since they have probably influenced its evolution in some small measure but they are not necessarily harbingers of the future A more serious problem is the design of the questionnaires to be employed If the items on the schedule are to be objectively coded they must be presented in a rigid format—either as statements to which the respondent may agree or disagree or as a set of alternative answers among which a choice must be made Such techniques suffer from a two fold weakness first they force the expert to adopt one of the alternatives presented so that the very subtleties of judgment which qualify the individual as an expert may be lost to view Second overly facile box checking techniques invite rapid off the cuff responses which may not reflect the careful consideration which is needed Finally the Delphi technique suffers from the loss of certain features which are unique to the committee setting The interplay of judgments and influences that occurs in face to face association may be of great importance in the development of reasoned views on a given subject Only through such contact can the participants perceive the nuances of meaning and intensity of convictions so essential in assessing the true significance of expressed views Much of this contextual matter is lost when we resort to written com munication All of it is lost when that communication takes the form of statistical measures of coded responses

**(2) Qualitative normative projections**—Several of Bell s modes of predic tion can be placed under this heading Reliance upon structural certainties to provide benchmarks in the future implies that these perceived certainties will continue to operate as norms in regulating significant areas of activity in a given society Similarly the assumption that operational codes or rules will continue to exert directional guidance in the future implies that a society s relatively stable sub strata of folkways and mores can be relied upon to provide some coherent framework within which future potentialities will find expression The attempt to develop projections which satisfy the structural functional requi sites of a society also belongs in this grouping inasmuch as these requisites may be recognized as delineating ultimate constraints on the evolution of any soci ety [14] Two additional modes might be classified here operational systems of

power and the overriding problem In the former approach the basic interests of the major power blocs in a given society are assumed to operate as norms which will continue to determine the ways in which that society adjusts or responds to changing circumstances and to strongly influence the formulation of societal goals in the future Similarly the development of a projection which reflects the possible resolution of what is postulated as a society s overriding problem imposes that solution as an ultimate goal or target Numerous elaborations of this type of approach are familiar to social scientists in the form of the classical theories of class conflict and the working out of the Hegelian dialectic of thesis antithesis and synthesis

The basic feature of all these approaches to the development of qualitative normative projections is their attempt to shift from what Massenet refers to as the principle of extrapolation to the principle of causality As Massenet observes this shift of focus should not be misconstrued as an attempt to predict within a framework of causal determinism in the usual scientific sense He expresses the distinction between scientific prediction and projection by means of postulated causal principles as follows [15]

> We must avoid establishing too close a relationship between science and social forecasting The first seeks to abstract out a causal relationship in all its purity the second operation in which the mind tries to imagine the future effects of presently existing causes is purely empirical In a word forecasting tries to enlarge the horizon of our knowledge of the concrete reality it does not tend to deepen our explicative knowledge of the structures of the world

Insofar as the above approaches are distinguished from the first group by virtue of their explicit concern with norms it would appear that social scientists would find a rich source of insight into the implications of alternative values and value hierarchies in undertaking the systematic development of normative projections Here also the Delphi technique offers some promise in view of its demonstrated utility in the development of normative forecasts in the technological areas

Before turning to a consideration of quantitative forecasting methods it may be appropriate to summarize our argument with respect to qualitative forecasting in general First qualitative forecasting cannot be adequately described as the application of any particular method nor can it be usefully evaluated purely in terms of its underlying procedures One can only repeat Georgescu Roegen s advice to economists in dealing with uncertainty Get all the facts and use good judgment [16] Although social scientists are amply equipped with tools for the collection and processing of data they are much less informed as to the ingredients of good judgment Second qualitative projections allow us both to appraise our present condition in the light of our values and aspirations and conversely to estimate the ultimate impact of our current values and behavior patterns upon our future condition Even if they fail to foretell the future they offer a unique perspective in our attempt to understand the present Finally the Delphi technique may be utilized to provide more systematic inputs of information which might improve the judgments underlying the projections it cannot be relied upon to produce those judgments

**(3) Quantitative exploratory projections**— Trend extrapolation and projection be means of social accounting schemes are the two major techniques listed by Bell which may be considered in this grouping Hacke distinguishes further among extrapolative techniques by recognizing projection on the basis of an assumed periodicity or in conformity to an assumed growth curve as separate from ordinary extrapolation in that these techniques impose external constraints upon the extrapolation that is produced [17]



From the viewpoint of the social scientist the chief difficulty in extrapolating a trend consists in the need to accept some numerical measure as an index of the phenomenon with which he is concerned The problem is not that such indices are unavailable but rather that they commonly fail to capture or reflect significant elements in the underlying phenomenon Two examples may suffice to illustrate this problem Labor force projections are commonly prepared by extrapolating observed trends in the activity rates of the several age sex groups of the population However the rates observed do not reveal the intensity of labor force participation (i e hours worked per week or weeks per year) nor do they reflect the work commitment of the individual worker (i e whether he is working temporarily or permanently) Similarly projections of the educational attainment of the adult population and labor force are prepared by extrapolating the reported years of school completed of successive age sex cohorts with an allowance for current school enrollment rates Obviously these data reveal nothing whatsoever in regard to what was learned in school out of school or since forgotten[18] Insofar as we are willing to accept a labor force participation rate as an index of the economic activity of a population group or a percentage distribution by years of school completed as an index of educational attainment extrapolations of trends in these indices provide valid and useful descriptions of future prospects in these areas These indices can hardly be criticized for failing to do something for which they were not designed But the interests of social scientists in the phenomena they purport to reflect cannot be met by this kind of convenient measure alone

A further limitation of trend extrapolation is familiar to all practitioners of the art except for arithmetical errors such projections are likely to be reasonably accurate so long as the underlying trend is maintained But they quickly become disastrously inaccurate as soon as the trend is disrupted for any reason Thus they fail at precisely the point where foresight would be most helpful—where the assumed continuity is broken by a turning point

The attempts of economists to project on the basis of observed periodic fluctuations in a time series and those of demographers in applying growth (logistic) curves to observed trends in total population do not offer great hope for the applicability of these techniques in other areas of human behavior While many forms of behavior display periodic fluctuations the recognition and measurement of this periodicity is useful mainly in establishing the existence of a trend when the effect of the periodicity has been statistically controlled The fluctuations by themselves cannot provide a basis for useful forecasts beyond the period required for the manifestation of one or two cycles at best The problem with the logistic curve is the need to specify both its upper asymptote and the time period required for its attainment Furthermore unless the curve is postulated as symmetrical there remains the problem of establishing the locus on the curve of the present status It is well established that the growth cycle of many

forms of life conforms to this kind of curve given a fixed ecological environment and a constant mode of adaptation thereto Insofar as human populations are concerned it is equally obvious that the mode of adaptation to the ecological environment is continuously modified by both social and technological develop ments

Despite the above limitations three arguments may be raised in support of the technique of trend extrapolation First such projections are simple to develop and the underlying assumptions and procedure can usually be described in a straight forward manner Such simplicity should not be confused with naivete When dealing with social phenomena whose inner dynamics are only partly understood the simplest procedure may well be the most defensible Second the technique is highly flexible particularly when the mechanics are carried out by computer Such extrapolations can be quickly updated by the insertion of the most recent observed values More importantly the observed time series can be re assessed periodically with the aim of removing or re weighting data which are deemed to be obsolescent irrelevant or aberrant Finally this technique by its very simplicity minimizes the danger that the resultant projections will be misconstrued as predictions reflecting the inexorable movement of some causal force within a deterministic framework Given the strong pragmatic arguments in favor of this technique it is likely that social scientists will continue to use it Therefore it may be appropriate to conclude by quoting Winkler s admonish ment to those economists who rely so heavily upon quantitative time series analysis [19]

> we seem to have forgotten that every time series is in the first place quantitative *history* of a situation and its analysis *historical* analysis This predominantly historical nature of time series has two aspects first in every series the definitions survey and computing techniques have their own development They are part of the data and must be considered when analyzing the series Second each series is embedded in a complete historical landscape of other events most of which cannot be quantified The data in a time series therefore are not a simple sequence of pure algebraic numbers but history presented in statistical terms

This reminder is a plea for the social scientist to retain a critical awareness of what is involved in attempting to deal exclusively with those aspects of historical reality which can be readily quantified It is also an argument for the continued development of qualitative projections wherein our interpretations of historical processes may find expression

**(4) Quantitative normative projections**—What Bell (and earlier Sorokin) has aptly termed social physics may be classified here together with the several techniques he refers to as decision theory The several projective techniques which can be grouped in this category have in common the attempt to construct some kind of representation of the actual functional relationships which charac terize some segment of human behavior This representation (or model) is essentially quantitative although it is of course possible to include unmeasured factors in the form of two valued dummy variables The resultant model can then be used to generate predictions by the insertion of given or assumed values for the independent variables



The difficulties to be faced in the development of such forecasting models in the social sciences can readily be appreciated by considering the fundamental requirements of such model construction The first requirement is a theoretical grasp of the relevant processes and relationships in the system—a requirement which presupposes the identification of such a system and its boundaries Second a body of quantitative data must be available which reflects the observed operation and mutual influences of the key elements in the system Finally there is need of appropriate statistical techniques whereby the postulated processes and relationships can be expressed in testable form—i e as a system of equations permitting separate identification of the influence of each major variable in the system

For purposes of forecasting such an equation system must satisfy a further requirement Either the key independent variables must exert a measurable lagged effect upon the variable to be predicted or else their future values must themselves be predictable In the first instance it is possible to predict the future value of the dependent variable from present values of the independ ent variables In the second case it is necessary to develop independent forecasts of the independent variables first In practice these values may be assumed so that the resultant prediction is in effect a prediction of the future values of every variable in the system In rare instances the independent variables may represent factors which are in some sense subject to control and can therefore be assigned desired or prescribed values

Finally the need to assume stability in the underlying structure of postulated relationships over the period of the projection introduces a strong flavor of hypothetical as if reasoning to such constructs Granting the availability of the necessary statistical techniques it remains an open question whether the behav ioral sciences including economics can be expected to attain the requisite levels of theoretical sophistication together with the essential data base At present these procedures can only provide at best heavily qualified predictions of narrowly defined segments of behavior under restrictive assumptions that are typically artificial and greatly simplified [20]

The prospects for the development of social accounting schemes as a tool for projective purposes may be more hopeful In manpower analysis for example the distribution of employed workers by occupation and industry as observed at a given census date can be utilized to distribute a projected employed labor force total for a future date so as to yield an estimate of the future occupational and industrial distribution of workers [21] In addition such an approach can be given a greater degree of verisimilitude by incorporating information on past trends in the occupational mix of the several industries It is also feasible in principle to incorporate information on the changing educational or training qualifications of workers in the future and thus to assess the probabilities of an emerging im balance between anticipated work requirements and available personnel possess ing the requisite skills Where these job requirements in turn are prescribed by the expected manpower needed to attain specified social goals the resultant matrix can be viewed both as a target for appropriate social and economic programs and as a prescription of the intermediate objectives which must be reached in order to achieve the primary goal [22]

Similar input output matrices might be useful in forecasting the need for

teachers and facilities in the area of education particularly in those fields where the attainment of specified social objectives entails the supply of certain numbers of qualified persons More challenging perhaps is the possibility that input output analysis could provide social scientists with a powerful tool for estimating and objectively demonstrating the probable spread of consequences stemming from particular inputs within the framework of human ecology If as is currently being suggested concern for the ecological consequences of our continuing industrial development is to become a major issue in the coming decades the possibilities for interdisciplinary research in combining ecological theory with input output analysis merit serious consideration The exploratory work with cross correlation techniques in forecasting the implications of given or assumed technological break throughs is a highly promising start in this direction [23] As Gordon points out a major criticism of the conventional Delphi technique is that it yields linearly independent forecasts whose possible interrelations may be overlooked Placing these alternative developments into an input output matrix provides a framework for assessing the probable impact of a given development or event on the probabilities of occurrence of the other elements in the matrix At present these assessments involve nothing more than the crude judgment that the occurrence of event X may be expected to increase lower or have no significant impact upon the probabilities of occurrence of the remaining events in the matrix But this approach at least introduces the notion of interdependence of outcomes into our reflections on future prospects

## FORECASTING AND PLANNING THE NEED FOR SOCIAL INDICATORS

In a recent science fiction novel the conditions under which accurate social prediction might be made are described rather neatly [24]

> Well what can heighten the predictability of human behavior? Two opposite conditions either the human goes mindless and becomes a purely physical victim of physical events or the human can form a purpose and persevere in it And what can heighten the prediction possibilities of *social* action? Two not quite opposite conditions there can be fulcrum events and forces which for a while dictate automatically and inescapably which way a society will go or there can be concerted longrange planned programs by a society or its power structure

This quotation helps to illustrate the dual function of social projections advance warnings and explorations of the possible In providing advance warnings of potential imbalances or impending crises they may serve to generate appropriate policies or programs whereby we can avoid the pitfalls which would otherwise reduce or eliminate our freedom of action In providing descriptions of the probable consequences of on going or proposed programs or practices they may generate a better understanding of their true costs and benefits together with a fuller awareness of the possible alternatives open to us In short social projections may help us to escape both the determinism resulting from problems left too long untended and that resulting from a failure to recognize the degree of freedom we may in fact possess



The requirements which must be satisfied if social projections are to fulfill this dual function suggest the directions to be followed in developing an improved methodology for projections in the social sciences In the first place quantitative procedures alone cannot be relied upon to produce an adequate awareness of alternative goals we might pursue or of the arrangements of our values whereby our social priorities might be more rationally determined Qualitative procedures on the other hand cannot possibly incorporate in a systematic manner the number and complex interrelatedness of the factors influencing social behavior Although the importance of qualitative or judgmental elements may be greater in developing scenarios of alternative futures than in extrapolation of trends or computer simulations these elements cannot be eliminated from any exercise in social projection

Three streams of current thought and practice point toward an eventual convergence in the so called qualitative and quantitative approaches to social projection First there is growing recognition by practitioners of the arts of model building systems analysis computer simulation and the like that their constructs and data manipulations are infused with qualitative judgments—an infusion which is dictated both by their research objectives and by the limitations of the data with which they must operate [25] Second there is the discovery shared with equal dismay by numbers of pure and applied scientists alike that typical social problems as presently conceived cannot readily be solved merely by applying the techniques which have proven so effective in physical science and its technological extensions [26] Finally there is the insight shared by such scholars as Emery and Klages to the effect that de Jouvenel s proposed surmizing forum cannot produce useful results until and unless these disparate methodologies are somehow combined [27]

A key element in achieving such a convergence is the development of improved social indicators Resort to such indicators in ascertaining our current status as well as our progress toward agreed upon goals is no guarantee that controversy can be avoided particularly with respect to basic values but the availability of such indicators offers some hope for the eventual development of a viable alternative to the endless and often fruitless confrontations between what Klages terms the imperatives of social stability and the demands for social innovation A recent study of the current status and prospects for the improvement of social indicators suggests both the directions to be followed and the distance to be covered in this enterprise [28] To begin with Sheldon and Freeman offer a needed corrective to the excessive enthusiasm with which social indicators (consisting largely of old wine in new bottles) have been greeted by technicians and policy makers alike They argue that social indicators cannot be expected to increase the objectivity of socio political policies because the social goals and values whereby policies are determined cannot be validated by an appeal to statistical descriptions of past and current status What we are and have been may tell us what we are likely to be in the future but not what we *should* be or *should* aspire to being Further indicators cannot be relied upon in evaluating social programs This limitation stems from our inability to develop reliable and valid measures of the effectiveness of given programs by statistical manipulations alone in the absence of experimentation under controlled conditions Finally social indicators they argue cannot be neatly organized into a

Social Accounting scheme because of our inability to rank the wide range of social phenomena to be indexed by means of a common interval scale such as monetary valuation [29]

Given these constraints Sheldon and Freeman suggest instead that social indicators should be developed with the more modest but attainable aim of providing a more adequate monitoring of the changing status and characteristics of society to which might be added a more challenging objective the construction of social indicators designed to provide new perspectives on both our accepted institutions and practices and the new modes of action and organization which challenge these traditions

In pursuing these objectives our desire to acquire convenient and objective indices of the phenomena of interest must be tempered by an awareness of the complexity of these phenomena In addition to the temptations of the new Philistinism Gross has warned against there is a danger that quantitative measures may be regarded as adequate reflectors of the phenomena they purport to represent purely because of their definitional explicitness Any quantitative measure or index enjoys the advantage that it can be defined in unambiguous operational terms Unfortunately the explicitness with which a given measure may be defined enhances its reliability by permitting its accurate reproduction but it does not necessarily guarantee its validity [30] Furthermore resort to quantitative measures or indices at least in the behavioral sciences does not necessarily imply freedom from ambiguity it merely transfers the locus of possible ambiguity from the terms employed in qualitative discourse to those employed in executing the operational instructions whereby values for the index in question are in fact obtained An examination of these procedures quickly reveals that many widely accepted quantitative indices are based upon responses to questions that both the questions and the responses they elicit are expressed in ordinary language and that these responses are subject to the possible distortions resulting from misunderstanding of the terms employed in asking the questions from faulty recollection from various kinds of rationalization or from deliberate falsification

But these limitations are well known to social scientists and statisticians alike What is more pertinent perhaps is de Jouvenel s reminder which appears to be addressed not to the technicians but to the decision makers and their informed publics—to those who are expected to utilize the outputs of the technicians in developing viable and rational courses of action in a world of uncertainty De Jouvenel reminds these potential users that [31]

> Designers of statistics are indeed philosophers however unwilling to claim the name and are fully aware that different aspects of reality can be lit up if alternative sets of concepts are used

Those who must decide on a course of action need more than a statistical model of the workings of selected aspects of the social system however elegant and intricate its construction To be sure such models should eventually facilitate our estimation of the probable consequences of alternative policies and assumed conditions but they cannot provide a deeper sense of social values and derived goals which alone lend meaning to any course of action By the same token social indicators must not only serve as benchmarks in our efforts to ascertain our current status and direction of change they must also specify for the decision makers the timing location and requisite conditions for effective decisions—i e where decisions may be expected to introduce new causal influences which can alter the course of events in a desired direction Insofar as social indicators can fulfill these needs in the context of public information they may ultimately provide the informational underpinning for the kind of rational and democratic decision making so eloquently described by Shackle [32]

> In a predestinate world decision would be illusory in a world of perfect knowledge empty in a world without natural order powerless Our intuitive attitude to life implies non illusory non empty non powerless decision



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Hardin extends this example to cover a multitude of contemporary social problems including traffic congestion air and water pollution and overpopulation arguing that these problems belong to a class for which there are no technical solutions at least unless accompanied by an extension of morality Crowe argues even more pessimistically that neither technical nor moral solutions to these problems are likely at present and that the continued growth of science is itself threatened by the societal collapse that may result from our continued failure to cope with these social problems He concludes with a plea for a concerted re direction of both social and natural science toward an active public information program in support of the changes in values and behavior which are required in solving these problems

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# A CONTRIBUTION TO THE METHODOLOGY OF FUTUROLOGY

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## Introduction

In spite of various profound methodological contributions in future researches there are still remaining unsolved a lot of crucial problems how to consolidate various effective methods which having been proposed and used by many authors in these areas in such a way that a systematic unified methodology of futurology of shall be fruitfully established The purpose of this paper is to pres ent a general survey on a few scientific disciplines with an expectation that we may be able to find out any key concept and crucial notion which can be useful for establishing a methodology of futurology

In section 2 we shall enunciate a system approach to studies of history by referring to works of two historians H N Carr [1] and J S Toynbee [2] Our general system approach is based upon the logics of information sciences which I have developed in my monograph [4] On the basis of our discussions and comments on relationship between studies of history and general system ap proaches we shall give a preparation for supplying a system approach to re searches of future It is the object of section 3 to suggest that a drastic evolution of the present planometics science of planning is required in order to give a technical basis for system approach to researches of future

Section 4 is a continuation of our discussions developed in section 2 with particular reference to information revolutions being now in progress

## System approaches in studies of history

In his monograph What is history? E H Carr [1] pointed out that the roles of testing hypothesis procedure in studies of history are in their logical context quite similar to those being currently used in experimental researches in natural sciences It is however noted that there are strong objections against the assertions of the similarity Indeed Carr [1] was quite conscious of such objec

tions and classified the reasons for such objections against the similarity between these two areas into the following five issues

(1) History deals with specific features of each individual events while science is concerned with general aspects which are common to a set of matters and events
(2) History yields us no lesson for guiding our actions to be adopted for the control of our future
(3) History does not invoke us with any ability of prediction regarding future phenomena
(4) History in its nature can not escape from being subjective
(5) History does imply necessarily some feature of religions and moralities

Carr [1] gave a detailed review of these five issues criticized the logical grounds to be granted for each of these claims and clearly declared that history must be recognised as a science by pointing out that in the real situations historians and physicists are appealing to the essentially same procedure in presenting their problems and in preparing their answers to their problems when they are engaged with the processes of finding out explanations to real events

All his reviews on these issues seem to us to be substantially based upon and derived from the recognition to the effect that the roles of testing hypothesis are quite similar to each other in both of these two approaches i e studies of history on one hand and experimental researches in natural sciences on the other hand

This recognition is crucially important in giving us a suggestion that futurology as a science of future can and must employ the procedure of testing hypothesis as one of the key research strategies This suggestion must be materialized into a comprehensive way so that a formulation of testing hypothesis and its logical treatment shall be fully systematized in futurology These works are however not so simple and indeed we shall be involved with various preparations before we shall get a definite formulation of the relevant concept which is fundamental as a basis for methodology applicable to futurology Nevertheless I think it quite important to emphasize here that the first basis foi our arguments and comments to be developed in this paper is nothing but the recognition of roles of testing hypothesis in future researches

Now the second basis is prepared through my observations on the famous works of Arnold J Toynbee [2] According to the general understandings of contemporary historians it is said that the characteristic features of his studies of history amount to be a comparative study of various cultures and societies each of which constitutes an intelligible field for studies of history and then lead us to find out any indication for predicting the future of the present civilization in which we are now living

Now we shall pick up some essential features of his approaches with which we have to be particularly concerned in order to discuss a methodology of futurology In fact we are concerned with some particular aspects of his approaches which can be observed from the standpoint of system approach in some generalized sense

My assertion that the Toynbee studies of history have certain characteristic features which can be interpretated as an application of system approach in some generalized sense may be criticized as fantastic by a majority of scholars including



professional historians and contemporary experts working in system engineering and system theories and will be definitely condemned to be entirely foreign to his own thought Nevertheless I do believe that there are several crucial aspects of his approaches which are common to fundamental procedures of general system approaches as I shall explain in what follows

(a) The notion of intelligible fields of historical study introduced and employed by Toynbee [2] in his studies of history is crucial in considering their connection with the method of general system approach According to his views there are twenty one or twenty three civilizations in the whole history of mankind each of which constitutes an intelligible field in his sense He claimed that each of these civilizations has various common problems to be subject to comparative studies and that each of them has common features regarding their historical process of genesis growths breakdowns and disintegrations In this connection I should like to point out that two fundamental logical principles in the logic of system theory can be manifestly observed to have been applied in his formulation of intelligible fields These two logical principles are nothing but the principle of cutting (Schnitt) and the principle of self conservation in a general formulation of system concept which have been introduced and used in my monograph [4] and also in my coming paper [5]

(b) We should here emphasize the role of relativistic logics in mutual specifications in studies of history As we have mentioned in (a) the role of the principle of self conservation is essential to identify our objects of study It is true that a system of self conservation may be studied through the framework of some adequate models and that it may be sometimes effective to appeal to some analogy with biological existences But these situations are too fortunate for us to expect to be always realizable

In many circumstances of studies of history we are neither in the position where a storage of universal models of civilizations does exist nor any civilization can be claimed to be analogous to biological existence in its strict sense All we can do in our start is at most to learn from our historical experience that is to start with fact finding observations on various examples of civilizations These obervations are essentially involving the procedure appealing to the relativistic logic of mutual specifications which I have explained in Kitagawa [3] in connection with logic of statistics The learning by experiences are also concerned with the procedure how to formulate a sequence of hypotheses to be tested in the sense of Carr [1]

(c) A set of the fundamental concepts in Toynbee theory of history is that of challenge and response with their mutual interferences My view in this connection is simply that we can introduce a set of correspondences of these fundamental concepts to those ones which are employed in system approach First of all a correspondence of input to challenge and that of output to response will yield us a basis for applying system approaches to studies of history It is however indispensable to remark immediately that elaborations should be required to complete these correspondences so as to reflect subjective attitudes which are originated from human abilities and decisions and which are manifested as from learning process during mutually interrelative course of challenges and responses It is evident that any relation between challenge and response can not be considered merely as application of feedback principle In fact all the possible

**Table 1 Three Coordinate Systems in Logic of Information Sciences**

| I & II | III | III Coordinate System | | |
|---|---|---|---|---|
| | | Control | Management | Creation |
| I | Objectivity | Pattern | chaos | transformation |
| | Subjectivity | operation | adaptation | strategy |
| Coordinate System | Practice | optimization | stability | learning |
| II | Cognition | deduction | induction | abduction |
| | Direction | control | management | creation |
| Coordinate System | Evaluation | efficiency | reliability | plasticity |

features of controls managements and creations should be expected to have their respective roles in the process of challenges and responses In this connec tion I may have here the opportunity to refer to my own monograph Kitagawa [4] in which three coordinate systems I II and III are introduced in order to specify the main features of various approaches belonging to information sciences For the sake of brevity I am here content with giving the above Table 1 for its illustration

(d) History is not concerned with static feature of civilizations in spatial circumstances in a certain fixed time but its main interests are concerned with its studies of dynamic behaviours when time proceeds and in particular with the genesis growth breakdown and disintegration of each civilization In the termi nology of system approaches dynamic processes of the system should be our main concern In the consequence it is the role of our general system approach to provide with a set of universally valid and strictly definable concepts which are to be employed in discussing the fortune of civilization

Some aspects of human struggles observed in the history of each civilization can be recognized as a process of so called plan do see procedures which human society has to employ in the face of challenges It is however to be noted that our civilization is always subject to the fortune of breakdown and or disintegration because the civilization can only work within a critical area of existence which is bounded by a certain set of boundary conditions and beyond which no existence is secured for civilization

(e) There are several crucial assertions due to Toynbee regarding growth of civilization which are worthwhile of one of the deepest considerations for our general system approach The optimal response to challenge should not only promise us an immediate success at that time but it should involve a sequence of challenge and response interrelations which will continue and which will intro duce a process of learning leading to a growth of civilization By growth of civilization Toynbee [2] does not mean social expansion of dominating area governed by the civilization but he refers to its inner constitution regarding its self determination or self articulation In view of his examples cited for illustra tions I think that the main emphases are placed upon effective revolutions of social systems associated with civilization Here again we can point out that his self determination theory of civilization growth can be enunciated in terms of



cybernetical system approaches in which communication and control are playing the predominant roles It is also to be remarked that Toynbee [2] does neither refer directly to any technological progress nor to any expansion of dominating areas in each civilization but that he emphasises the role of creative responses invoked within civilization itself These aspects of civilization can be discussed with reference to the processes of self organization in system theory

Now here naturally arises the question how such creative self determination can be invented within each individual civilization Toynbee [2] answered to this question by reducing the origin of civilization growth to creative behaviours of intellectual elites living in the civilization whom he calls creative individual or creative minority

Creative activities in civilization are essential factors in the Toynbee theory of civilization Toynbee [2] discussed not only the growth of civilization but also the breakdown and the disintegration of civilization with reference to creative activities in the civilization and their influences to self determination power of the civilization

Some aspects of Toynbee theory [2] is quite understandable from the stand point of general theory of system approach As I have already referred in Table 1 the main aspects of information functions can be viewed from the III coordi nate system of information and indeed these can be classified into three categor ies control management and creation The emphasis of creation in each civilization by Toynbee theory is therefore yielding a strong string connecting his studies of history [2] and our general systems approach developed in [4]

A theory of creation is still in the stage of infancy but I have referred to creation process from a general formulation of logic of information in my monograph [4] and I have pointed out that researches on creation process will be one of the serious subjects to be investigated in the general framework of infor mation science It is to be noted that there will be mutual aids between studies of history and general system approaches by exchanging their respective knowledges with each other Indeed system approaches can provide us with logical analysis of creation power through the frame of information science while studies of history can yield a lot of actual examples regarding the role of creative individuals and their influences to majority of people through communication systems in the civilization

(f) According to the terminologies due to Toynbee [2] civilization will pass through three different stages called time of troubles time of universal state and time of interregnum during any course of its breakdown and its disintegration and its members of society will be split into three categories namely dominant minority internal proletariat and external proletariat Here it is noted that the essential factor in this stage of civilization is nothing but an existence and a power of creative abilities inherited in the civilization For instance in spite of super ficial appearance of its economic prosperities and its political unity universal state is evaluated by Toynbee [2] as sign and result of lacking of creative poten tialities of the civilization The Toynbee evaluations of universal states appeared in the history of mankind may be criticized as one sided observation in which many important aspects and roles of universal states are being escaped from his considerations However so far as system approaches are concerned his emphasis on creativity of civilization is quite understandable from our standpoint in

which the main characteristic features of our system can and should be analysed with reference to its functions dealing with information and controls In particular we should emphasise the roles of learning and plasticity referred in Table 1 which are connected with creation viewpoint in the III coordinate system

(g) We can not leave our considerations regarding mutual aids between studies of history and general system approaches without referring to the conclusive features of the Toynbee theory of civilization regarding roles of what he calls universal religions and universal churches From the standpoint of our framework of general system approach based upon logic of information a reli gion is a hierarchical system of evaluations which will give a guide for selecting and designing other information functions such as cognition and direction as I have referred in the II coordinate system in Table 1 A system of evaluations plays its important roles in controls managements and creations as having been very acurrately formulated in these areas

However it is crucially important to find out where each individual civilization has its total evaluation system and how and under what conditions it can be revoluted into a new system This remark is a necessary consequence of our general system approach to studies of history It is well known that Toynbee [2] referred to the role of universal religions and universal churches in this connec tion All what we need here is an existing system of evaluations in each individual civilization which we should try to analyse from the standpoints of information functions with reference to controls management and creations

In conclusion of section 2 I should summarize my observations to the effect that system approach in our generalised sense can be duly a candidate methodol ogy in studies of history as I have checked it in particular with reference to the theory due to Toynbee [2] I am not and can not be concerned with the profes sional problem of historians whether and how far the Toynbee theory can be valid from the standpoint of historians but what I have observed in this section amounts exactly to the assertion just mentioned which is in fact necessary and sufficient for our present purpose On the other hand it is to be noted that system approach in our sense is somewhat more generalised than those being currently adopted by system scientists of and engineers at the present time However I have already referred in my monograph [4] some principal aspects of such generaliza tions with reference to general framework of logic of information

## Generalization of planometrics for the uses of futurology

Mathematical formulations of planning theories have been fully developed during the last twenty years and they are now systematized so as to be coined as planometrics which covers various methods developed in the areas of mathe matical programmings economic plannings and operational researches The framework of planometrics is however rather simple and common among various theories because they are all defined with reference to the following items

(i) state variables of system
(ii) strategic variable (s)
(iii) system mechanism
(iv) system constraint (s)



(v) system targets

Now there are many authors who claim that methods of planometrics can be useful for solving various problems belonging to designs of future In fact there are not a few scholars who seem to believe that fruitful methods to be useful for futurology can be expected along the lines which are indicated by the present development of planometrics However we should be very careful for evaluating the validity and the effectiveness of planometrics beyond a certain barrier of its present applications This caution follows from our considerations on studies of history as enunciated in section 2 I shall explain the reasons for this caution in some details

I have already referred to a general system approach which may be applied to studies of history It is to be noted however that this assertion does not imply that an application of the current system approaches will be sufficient enough for our purpose Indeed there is an urgent need for generalization of the current system approaches into a new system approach so various methods and notions given in Table 1 according to three coordinate systems shall be fully utilized In particular our system itself to be used in future researches must be adaptive and learning Subjective attitudes to be formulated in our system must have three aspects i e operation adaptation and strategy Principles of evaluation should not be confined to efficiency but they must be broad enough to contain reliability and plasticity at the same time Indeed we are not restricted to control aspect but our attitude should be sufficiently broad enough to cover management aspect and creation aspect given in table 1 The whole set of notions essential to logics of information are listed in Table 1 and after all these notions are indis pensable for our general system approach to future researches

In what follows I shall give several comments on the five items (i) (ii) (iii) (iv) and (v) just mentioned

(i) **State variables of system** In the first place I have to point out that cur rent formulations in planometrics are mostly if not exclusively being referred to mass quantities In some future researches which are for example deeply concerned with social reformations we have to expect that state variables of a system should not and can be confined to such mass quantities Indeed there are demands for introducing a new set of state variables which have a deep connec tion with the following aspects

(a) welfare and fortune of each individual human being
(b) welfare and fortune of mankind as a whole both as social existence and as biological one
(c) machine intelligence machine capability and their implications to human beings

(ii) **Strategic variable (s)** Here we have better to remind of challenge and response relations intruduced by Toynbee [2] in his studies of history It is remarkable in his studies that responses do not necessarily mean some technolog ical innovation being invented in front of challenges from surrounding environ ments Indeed an invention of feudal system in the Western Europe during the early stage of medieval times can be considered as strategy against the invasions of Scandinavian people Feudal system was indeed a military and social instru

ment which however proved itself to be a source of social economic and political differentiation involving serious class conflicts and which turned out to be a new challenge to the Western Europe

In front of the challenges there was again an invention of sovereignty state in the Western Europe These histories give us an important lesson to the effect that our strategy in future researches should not be confined to any set of strategic variables but it may be concerned with the framework of the system itself Unless we have a sufficiently broad class of feasible strategies in our consideration any application of system approach may become to be too re stricted to give us a guide for our decision regarding the future

(iii) **System mechanism** In future researches we may be rather concerned with an invention of a new system to be replaced instead of old one and we shall have to investigate dynamic processes of the new system For such an investigation we might be better to appeal to various simulation techniques rather than to endeavour to find out a certain set of equations which may describe with a certain tolerable accurary the system in our concern but which are sometimes too complicated to mathmatical analysis

So far as the present state of planometrics is concerned its mathematical formulations are mainly connected with those being derived with physical sciences It is hoped therefore to seek for mathematical apparate which are particularly suited for biological sciences and social ones in order to have a rich storage of mathematical models to be useful for our generalized system approach to future problems

(iv) **System constraints** Since system constraints can be enunciated in terms of state variable (s) and strategic variable (s) it follows that system constraints are not so rigid but rather plastic in most cases of future researches Moreover an invention of a new system as illustrated in (ii) will involve a set of entirely different constraints Here an invention of a new system may be sometimes an introduction of new social and / or political system to our society while in other cases it may be a consequence of a technological innovation involving industrial revolutions

Since one of the very important areas of future researches is concerned with technology predictions system constraints depending upon technology are worth while to be analysed in systematic procedures

(v) **System targets** These are deeply concerned with evaluation aspect to be adopted in the system In Table 1 I have mentioned three evaluations aspects effectiveness reliability and plasticity each of which may be indeed an indispen sable criterium of evaluating our system Instead of restricting our viewpoints within the scheme of effectiveness our attitude for inventing a system or for evaluating our system should be broad enough to cover all these aspects Indeed the responses to challenges in each history of civilization had not been confined to aiming at effectiveness but they had been sound enough to take into consider ation reliability and plasticity at the same time Here again there is an urgent need for system theory to be compatible with such attitude of human behaviours



## Information revolution and futurology

We are now entering into cybernetical era in which technological innovations regarding information processings have been involving revolutionary changes of productions managements economics administrations politics and human activities in general as well as those of sciences and educations Several scholars are now referring to various future aspects of the coming societies with regard to cybernetical revolutions Indeed so far as the coming twenty or thirty years are concerned most people seem to agree with the views that the future aspects can be the most adequately predicted with reference to the so-called information revolutions which are considered to play the predominant roles in the coming societies However here I am not going to enter in any detail of these future aspects Instead I shall state very briefly some comments which should be kept in mind in discussing the future of human societies in such a framework

I shall illustrate these comments in connection with and indeed as a sequel to the discussion given in section 2

(1) It is indispensable to set up an intelligent unit of future researches similarly as those suggested by Toynbee [2] in the case of historical studies I myself am far from any conviction to the arguments which describe for example the future of Japan independently upon surrounding international conditions

(2) It is agreeable that the impulses and the origins of information revolutions have been coming from technologies innovations including computation control and communication for the last quarter of the present century But it is now required that transfer our standpoints from the ones being based upon technol ogy aspects to those having larger scales of time In this connection a lot of historical lessons and metholodogical insights which are particularly suited for our present purposes seem to us to be hidden in the famous works of Toynbee [2] as I shall explain in the following paragraph (3)

(3) It is to be noted not only that the general structure of Toynbee theory of geneses growths and breakdowns of civilizations has an intimate connection with a generalized system theory as I have referred in section 2 but also that some of its fine structure can be observed to have deep implications worth which to be considered from the standpoints of communications and controls A few examples are given here to point out them

(a) III The growth of Civilizations IX The Arrested Civilization (4) General Characteristics X The Nature of the Growths of Civilizations (2) Progress towards self determination X The Analysis of Growth (3) Withdraw and return creative minorities

(b) IV The Breakdowns of Civilizations XVI The Failure of self determina tion (1) The Mechanicalness of Nemesis (3) The Nemesis of Creativity Idolization of an Ephemeral Self (4) The Nemesis of Creativity Idolization of an Ephemeral Institution (5) The Nemesis of Creativity Idolization of an Ephemeral Technique

(c) V The Disintegration of Civilizations XVIII Schism of the Body Social (1) Dominant minorities (2) Internal proletariats (4) External proletar iats

(d) VI Universal States XXV Sic vos non vosis (1) The conductivity of

universal states (3) The serviceability of imperial institutions communi cations garrisons and colonies provinces capital cities official languages and scripts law calendars weights and measures money standing armies civil services citizenship

(4) Some of the arguments developed by Toynbee [2] have not yet any corresponding formulation in general system but they are suggesting us the needs and the possibilities to cultivate broad areas in general systems regarding system interactions A few examples are given here just to give these areas

(e) IX Contacts between civilizations in space XXXII The Drama of encounters between contemporaries XXXIII The consequences of encounters between contemporaries

(f) X Contacts between civilizations in time XXXIV A survey of renais sances

(5) General system theory enunciated in section 2 should not be free from the viewpoints of evaluation The following Parts of Toynbee works [2] are so deeply originating from his religious thoughts which are nothing but his evalua tion frameworks in our terminology I believe these thoughts should not be considered to be inseparable from his other parts of historian thoughts At least from our standpoints we have still a freedom of choice among some possible evalution schemes Two examples are given here just to mention the arguments of Toynbee [2] which so much rely upon his religious thoughts

(g) V The Disintegration of Civilizations XIX Schism of the soul

(h) VII Universal Churches

## Conclusion

We shall give here a summary of our surveys given in the last few sections It has been our sole purpose to seek for any positive methodology for futurology For this purpose we have made a new observations on studies of history partic ularly with reference to works of H N Carr [1] and A J Toynbee [2] I have suggested some interrelations between historical studies and general system approaches among which some are existing but others are to be expected in the coming days It is in fact our idea to foster an analogous interrelationship between future researches and general system approaches which I hope may be regarded as a suggestion to establish a methodology of futurology

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# METHODOLOGY PROBLEMS RELATED TO THE ESTABLISHMENT OF A GENERAL SYSTEM OF PROGNOSTICATION

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The bulk and spontaneous development of prognostication is a remarkable phenomenon of the time we live in Prognosis are made in all countries in the world in all fields of science and social life Prognostication is already taking shape as a separate branch of science many books have been published on this subject and there are special courses in scientific prognosis at the universities

Man s desire to look into the future is as old as man s ability to think but the possibilities for making sound scientific prognosis have increased considerably in the last few decades One of the fundamental tasks of each science of each scientific investigation is to make a prognosis of the phenomena and processes which constitute the specific object of investigation Mendeleev s tables are a classical system of prognostication in the field of chemistry Marxism Leninism is in our view another prognostication system forecasting the main lines of the historical development of society Each science builds its own prognostication system for the processes and phenomena it studies

The emergence and development of modern prognostication as a separate branch of science has come to meet a new demand Its purpose and significance are not confined to this alone If it were merely a matter of prognosticating certain processes and phenomena this is the special task of the respective branch of science The necessity of an integral science of prognostication stems from the existence of common needs of common principles and regularities valid for all sciences valid for all natural biological and social processes

It is in this sense that one can speak of prognostication as a separate science the product of differentiation of scientific knowledge At the same time this differentiation is a manifestation of the process of integration of sciences The establishment of prognostication as a separate branch of science proves the existence of general principles methods and regularities valid for all natural and social phenomena for all—natural biological and social sciences The existence of these common features is also confirmed by the fact of the rapid development of other sciences and methods of a general / common to all sciences / character Such for instance are the theory of system theory of information cybernetics etc

All these sciences and prognostication itself result from the objective necessity of an ever more complete complex and accurate description explanation and prognostication of the natural and social phenomena and processes

The elementary task of any scientific method and of any concrete prognostica tion system is to reveal the fundamental components and / or elements of this system to reveal the functional interdependence between the elements of this system

However the tendency of searching the elementary imposes limitations on the explanation and prognostication of the phenomena under study These limita tions lie in the impossibility of covering the connections between the various systems Hence the tendency of building ever more general more abstract sys tems and models Let us take for example the prognostication of steel or oil production which is connected not only with the possibility of uncovering the respective natural resources or inventing the technical devices for their extraction and processing but also very closely with the entire economic and social system Without linking geological prospecting with the technological processes and the latter with the economic and social processes it would be impossible to make any scientific prognosis on material production

All this has necessitated the quest for new methods of integrating the various prognostications for the establishment not only of common methods and a common methodology of prognostication for all sciences but also for the establishment of a *common general prognostication system comprising all kinds of prognosis* A general prognostication system which would make it possible to organically unite all kinds of prognosis—in the field of the natural biological and social sciences Such a general prognostication system should define the *common elements* of all prognostication systems it should subordinate all prognostication systems it should create general methods of defining and measuring any values / processes phenomena facts / under study The general prognostication system should create possibilities for free transitions from one prognostication system into another for free transitions from one degree of research into another from one stage of generalization into another or from macro to micro phenomena and vice versa

Without the establishment of a general prognostication system of the above description it would be impossible to achieve integral prognostication it would be impossible to bind together the various prognosis on the development of nature and society

Now that science and mankind have already begun to feel the practical neces sity of complex prognosis of the simultaneous and joint prognostication not only of individual natural phenomena but of natural phenomena in combination and interdependence now that people have begun to feel sharply the need of prognosticating not only isolated social facts and phenomena but social develop ment in general now that science has acutely felt the need of connecting the development of natural phenomena with social phenomena and vice versa the establishment of a general prognostication system has become a vital task for the development of science as a whole It has become imperative that prognosti cation be established as a separate branch of science

The problem of establishing a general prognostication system valid for all sciences / as well as of establishing a similar system for every special branch of



science / adds up in our opinion to the problem of building bridges between the different sciences of building bridges within the respective sciences / between the various subdivisions and levels of these sciences / In sociology for instance this is a problem of building a bridge between micro and macro sociology The prob lem of building bridges however is confined to the problem of revealing the common elements of the various sciences and of the various subdivisions and levels within a certain special science Without the establishment and accurate formulation of the fundamental categories of each special science and of all sciences in general it would be impossible to build bridges between them neither to create a general system of modelling and prognostication The develop ment of the theory of systems of the theory of information is an indication that such common features principles and regularities valid for all sciences have already been established The question arises whether on the basis of these notions alone one could build the general model of science and along with that—a general prognostication system This in our opinion cannot be achieved today on account of the inability of these categories to make qualitative transi tions from one phenomenon into another because of their lack of adequate concretization and therefore because of the impossibility of transitions from one system into another Other categories are necessary sufficiently general to comprise all phenomena 2nd processes / natural biological and social / suitable for adequate concretization and accurate measurement allowing transitions not only on a horizontal but also on a vertical plane ensuring not only bridges but also ladders by which one could proceed in both directions

Such universal categories are *time space mass* and *energy*

What is it that is common to all these phenomena of objective reality what is it that is so common to the physical chemical biological and social processes and phenomena? Common to them all is the fact that they exist and take place in time and space Well known is the philosophic definition of time space and movement as *general forms of existence of matter* These are *common features* of all forms of existence of the matter

However the knowledge of these common features is not sufficient to build the operational general model of sciences and to establish a general prognostication system It is necessary to conceptionalize and operationalize the transition from that level to the lower more concrete levels of existence of the matter

It is well known that physicists do not measure space and time in general but the physical time and space the physical mass and energy In this light time and space mass and energy appear as *universal forms of physical matter* It is for this reason that time and space mass and energy are the basic fundamental cate gories of the physical sciences

Biologists measure the biological time and space the biological mass and energy as basic forms of existence of biological matter They are therefore categories of the biological science

Sociologists have not yet agreed to consider space and time mass and energy as basic forms of existence of the social phenomena and processes However the global description and explanation of the social processes and phenomena could not be achieved without the adoption of these categories as fundamental Here again time should be regarded not as time in general but as Social Time and space not as space in general —but as *social space* mass and energy not in gener

al but as *social mass* and *social energy*, as fundamental forms of existence of the social matter and hence as fundamental categories of the social sciences

What we have in mind is *qualitatively different forms of space and time* by analogy of what is generally referred to as qualitatively different forms of movement of matter [1]

As universal forms of existence of matter time and space mass and energy are identical for all concrete phenomena for all forms of reality / they are the general and the concrete / they are a high degree of *abstraction* of generalization of the facts of reality Narrowing the degree of abstraction of generalizing the facts of reality we differentiate the physical from the biological and the biological from the social Time Space Mass and Energy —they are of different quality as different as the physical biological and social phenomena are from one another From the view point of the general they are the same but from the view point of the concrete they are qualitatively different as different as the facts of reality each one of them reflects

Space and Time mass and energy are not categories lying outside the specific aspect of reality they reflect they are real categories reflecting real facts of the world The harder we try to reveal the real content of these categories the closer we draw to the concrete facts of reality and vice versa the more abstract our approach to these facts the more general our view of them the farther we get from the specifics of reality and the closer we draw to the essence of nature to matter as a whole as an integral entity —the closer we draw to the general in all forms of existence of matter Space and Time mass and energy as general forms of existence of the matter are the same for the physical and biological processes and phenomena Therefore the same methodology and technique of their definition and measurement can be used However if we should try to differentiate these categories and to examine them as specific forms of the biological or social processes and phenomena we should use a different methodology and different technique for their definition and measurement

It is not a question of selecting one or another method of definition or measurement The problem of differentiating between the physical biological and social time is not a problem of different metric systems or of the application of special mathematics It is above all a *topological* problem of revealing and defining various topological properties and qualities That is why agreement should first be achieved on the definition of the *criterion for this agreement / congruance /* Then the selection of the respective metric system becomes a purely practical task[2] For the establishment of a general model of Science and hence of a universal prognostication system it is essential that the general categories of space time mass and energy be defined and measured on different levels simultaneously as something qualitatively identical and qualitatively different and that not only for the separate sciences / as has already been achieved in physics and owing to which the great achievements of this science have been scored / but also in all other special sciences

The greatest difficulty in this respect lies in the field of the social sciences This

[1] See A M Mostepanenko Problem of the universality of the basic properties of space and time Leningrad 1969 p 5

[2] See J J Smart Problems of Space and Time New York 1964 p 10 and 23



is the most important link that is missing in the chain of building a general model of science and of establishing a general system of prognostication This is the link which stands at the top of the hierarchical pyramid Because social matter is the supreme form of existence of all matter it is a form which integrates and subordinates all other forms of matter

Is it possible for time and space for mass and energy to be concretized and specified? What is the concrete content of time and space of mass and energy as specific forms of existence of social reality? Is it possible to define social reality topologically and metrically all at the same time using for the purpose the fundamental categories of science—space time mass and energy?

Only after a positive answer and a concrete solution to these problems could the essential elements of social structure be defined and the inherent forces of the social system be accounted for Only then could a conceptional and metric / operational / linking of the social system with the other systems be achieved Only then will it become possible to establish a general system or a model of the natural and social phenomena and processes and build a universal prognostication system

When we are able to define both topologically and metrically time and space mass and energy at different levels and for the different forms of existence of matter will it become possible to build such a logically complete system of dynamic generalization in which almost all elements could be examined as interdependent with all other alternating elements in the system [3] And this equally applies to both the social system and to the general system of sciences about nature society and human thinking

It is known from physics and from the theory of dimension that it is possible for space and time to be reduced to one another and deducted from one another [4] Also known is the similar connection between time and space on the one hand and mass and energy on the other That is why we shall examine here the possibilities for the topological and metric definition of time for the various forms of matter without dwelling on the analogical problems of space mass and energy / this restriction is imposed by the limitations of the present report /

How could one define time as a general and specific category of science How could the time element be used to characterize the objective processes qualitatively similar and at the same time qualitatively dissimilar but possessing the same logical structure and therefore the same metric with possibilities for transition from one quality into another Why has Time become the main component of the structure of modern physics and a fundamental category of that science Is it also possible for Time to be regarded as a fundamental category of the other concrete sciences while preserving its fundamental properties?

Time is a general form of existence of matter It reflects and expresses the mutual relations between existing objects processes and phenomena characterizing their *sequence* or their *order one after the other* Such a sequence is characteristic of all objects phenomena and processes physical biological and social What was a certain phenomenon yesterday what is it today and what will it be tomorrow? This question can with equal justification be put in reference to all

[3] T Parsons Essays in Sociological Theory p 216

[4] See Gnoseological Aspects of Measurement Kiev 1968 p 240 etc

phenomena and processes This by the way is the main question in prognostication However such an extreme degree of generalization could not mark the qualitative differentiation between the physical biological and social phenomena On this level they are all similar and in view of this common quality they are comparable and commensurable

Thus the temporal relationships / relationships in time / express the development of the processes and phenomena From this point of view the difference between the physical and social time is in that the first expresses the temporal relationship between physical objects and phenomena and the second expresses the temporal relationships between social phenomena Time does not exist outside the real processes and phenomena therefore it cannot be defined outside these processes and phenomena Time cannot be seen or touched And yet it is an important physical biological and social fact It is as real as the processes and phenomena it reflects—as real as the mass and energy of the processes and phenomena whose sequence it reflects In this respect time does not differ much from the other facts of science Not one phenomenon or process could be defined in isolation from some other processes and phenomena That is why it must be recognized as a general principle of science as has already been recognized in physics [5] that no fact of reality can be defined in absolute isolation from the rest We can take for example the method by which Marx defined the value of money and all its conversions known in political economy [6]

Time as a fact of reality is a relationship and therefore it can only be measured as a relationship and not as an isolated fact in itself Time can only be revealed and measured in the relationships between the real facts processes and phenomena containing this temporal relationship This is of great importance for understanding the nature of time in general and of social time in particular Social time can be revealed and measured only as a relationship between the social facts phenomena and processes

Time can be defined and measured by different methods as required by the objects and phenomena under study Some primitive tribes are known to have used different methods in measuring time This has created additional difficulties in the measuring and comparing of time in different epochs and societies There are still greater difficulties in the defining and measuring of time in the dynamic society we live in which is characterized by its great relativity This is due to the lack of understanding of the profound nature of the processes to the lack of agreement on the definition and measuring of the various types of time and to the lack of a unified metric system

[5] we must admit—the well known physicist A S Eddington writes that physical quantities are not the property of definite external objects but the relations of these objects with something else that our physical quantities belong not exclusively to the objects being measured but are related to the specific framework of the movement we have chosen to study A S Eddington The mathematical Theory of Relativity Cambridge Un Press 1965 p 5

[6] Let us recall here the comparison drawn by Karl Marx in his definition of Value as a relationship that is not like the widow Quickly (who can be seen or touched) but that it can be revealed and understood only as a relationship between goods
K Marx and F Enghels Works volume 23 p 56 /Russian/



Various methods could be used for the measuring of individual human activities / as is widely practiced nowadays / It is important however to note the qualitative similarity of all these activities / that they are all human activities that they are all social activities / and that in this essential quality of these activities their duration / the time in which these activities take place / is qualitatively different from the physical time The kind of measure used is of practically no importance what really matters is the use of one and the same measure for all qualitatively similar activities processes and phenomena That is why the physical measures of time can successfully be used for measuring all individual and social activities However it would be a mistake to assume that the measuring of human activities by physical standards of time / hours days years / is merely measuring the physical time of the respective period It is in fact the measuring of social processes and phenomena the duration of social processes and phenomena and is therefore the measuring of social time Not all temporal relations however are social time They may often be manifested and perceived as space or energy or mass The individual psychological and social training of man at the present stage does not allow for an accurate differentiation to be made between physical and social time between physical and social space mass and energy In most cases the natural and biological phenomena and processes are regarded as space relationships and that is why the main measurements used in this field of science are space measurements while most of the social facts and phenomena are regarded as temporal relationships—historical relationships

In order to understand these relationships one should first understand space relationships and their interdependence with temporal relationships and of these two with mass and energy / this however is not the objective of the present report /

We should only note here that social space is the space relationship between social facts and phenomena / social phenomena viewed as co existent side by side /

Social mass is the materialized social past and social energy is the saved social time or the gained social space By its essence social energy has nothing in common with physical or biological energy It expresses the relationship between social time space and mass / just like physical energy expresses the analogical relationship between physical time mass and space / The only thing they have in common is their structure and their difference corresponds to the difference between physical and social matter

Quite significant in principle is the possibility for each and every form of matter —time space mass and energy to be defined organically linked together by the same logical structure / and hence the possibility of applying the same mathematical apparatus / bearing of course in mind their qualitative difference and specifics

In clarifying the similar logical structure and different real content of the social and physical time the question of the transition of the one into the other still remains unsolved The transition of one into the other of the physical into the social does not and cannot occur directly but only through a system

The ever wider use of physical energy in social production does not imply a corresponding increase in the employment of social energy It would therefore be vulgar and inaccurate to compare the economic and social development of two

countries by the extent of application of physical energy The influence of the physical time and energy on the social is exercised by means of the whole social system and this influence should be measured by the social time and social energy and not vice versa The increase of social time and social energy through the increased application in social production of one or another kind of energy should be measured not by Horse Power or Kilowatt Hours but by the *saving of social time* by the saving of man hours which is achieved through the ever wider harnessing of the forces of nature

The supreme criterion of the efficiency of a society is the saving of man hours of social time or the development of social energy This criterion must be adopted in defining the influence of the application of one or another kind of natural matter space and energy Only within the framework of social time only within the system of human relations in their entity / measured by social time space mass and energy / can we find the right criterion for linking the physical and biological systems with the social system

The physical time and energy included in the social system become a part of it they thus lose their significance as certain definite physical quantities alone They turn into purely social quantities and their definition and measuring can therefore be achieved by means of social and sociological categories

This requirement is of particular importance for the establishment of general models of science and of a universal prognostication system We thus arrive at the question of the subordination of the physical and biological and of these two to social time mass and energy

They are a high criterion for the appraisal of the efficiency of the use of one or another kind of materials of the development of production of the use of one or another source of energy of the utilization of physical space / cosmic space included /

A special mathematical apparatus is needed for these qualitative transitions / from physical to social time / Such an apparatus is afforded to us by Tensor Algebra This however is a question of metrics which needs a separate solution At the present stage of development of science such a technique is of great importance However in order that it may be successfully applied some fundamental categories of science must be established for the qualitative definition of the objectives of research which would allow their accurate quantitative measurement—the construction of a sound logical system of sciences which will make possible their organic linking together—first conceptional and then with the necessary mathematical apparatus and with the respective calculating techniques Each metric system should be based on the respective topological system i e each qualitative definition and measuring should be based on a strictly defined quality It is our task here first and foremost to outline the general common and more concrete qualities of the various forms of matter—they all however are defined by the same logic of the same structure allowing not only for quantitative but for qualitative transitions as well

Such a logical structure of the basic elements of sciences creates possibilities for the simultaneous application / observing the respective sequence in each separate case / of the inductive and deductive methods of exploration

As regards social science such a method allowing for the complete integration



of these sciences allowing for the uniform definition of social time space mass and energy is the *budget of time*

Since there can be no social activities phenomena or processes outside the time of the people since the budget of time will comprise all possible human activities by measuring all activities of the people within the framework of the budget of time one could measure the temporal characteristics of all human activities and hence of all social phenomena We shall not dwell here due to the space limitations of this report on a more detailed analysis of the basic properties of the method of the budget of *time* We should only note that through it we could measure not only the *duration* / time characteristics / of human activities but also the space characteristics of these activities / their relations as coexistent / their relations over a certain period of time When all these data are obtained one could define and measure by the respective method the social mass / the materialized social time / as well as the social time saved—or the gained social space or social energy

In our opinion all prerequisites for the operationalization of these processes for filling up the logical mathematical formula with concrete real content / with experimentally defined data / are available at the present stage Thus after collecting the primary information for the individual budgets of time and about the individual spending of time / and data measured by the human time invested i e social time / and after the complete integral differential and tensor calculations are made these data can be processed by the electronic computers

All this comes to show that today the establishment of a general model of sciences / using the fundamental categories of time space mass and energy / as a general category of sciences and at the same time as specific categories for each one of them is a basis not only for the theoretical integration of sciences but also for their full mathematization and technization Then such an ideal prognostication system will be created as would enable us to employ the models suiting our purpose first mathematical then mathematical statistical and after that experimental models Though at first glance this may seem a very complex task it will subsequently simplify to the extreme the modelling and prognostication of events in nature and society This universal model will make scientific and statistical information comparable and commensurable The excessive bulk of information will thus be reduced The information explosion will be checked through its subjection to the processes fully organized and controlled by man The same primary information can be mathematically processed without collecting additional information for defining other levels This qualitative uniformity comparability and transitionability / convertibility / of the collected information from different sciences will bring about a genuine qualitative leap in scientific research It will create conditions for the genuine technization and industrialization of the processes of research modelling and prognostication of the natural biological and social sciences

This unification of the sciences will have yet another important effect It will make much easier the transitions from one science to another / it will remove the present Column of Babylon in science when workers in different branches of science moreover in the same branch of science do not understand each other because they use different categories and different apparatus of research /

Another major advantage and effect will be produced by the great saving of time for the training of scientific cadres The adoption of universal categories of a general structure of science will facilitate the transition from one activity into another and will considerably reduce the time of mastering scientific knowledge The existing problem of overcrowded school plans and programmes will be solved This immense saving of time / now wasted on collecting and studying such a large variety of scientific information / will be spent on the research of other vital problems concerning the development of nature and society as a whole on securing the uncontested domination of man over nature on the conquest of outer space and on raising the living standards of the people for the free and harmonious development of man and his society

# SYSTEMS ANALYSIS FOR POLICY PLANNING

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We are living in an age of great transition from industrial to post industrial societies Through the past two hundred years of industrialisation modernisation urbanisation and so forth our world has rapidly changed from an agrarian to an industrial world with high standards of living for the masses Our country has also fundamentally achieved the national goals of industrialisation and we are facing with such new problems as (1) what should be the new social goals for the future of Japan (2) what kind of new value systems we have to create (3) how to solve the new social problems of which we have no precedents

Traditional ways of thinking ways of problem solving institutions knowledge and technology have already been obsolete but the alternatives have not yet been invented In this paper I would like to focus my attention on a new approach to meet with the needs for the social innovation

## 1 DEVELOPMENT OF SOCIAL TECHNOLOGY HISTORICAL BACKGROUND

The instability of the contemporary civilisation is caused basically by the existing gap between physical and social technology While physical technology has been developed remarkably and has given us great possibilities to control our physical environments our knowledge and technology to adjust human and social relations have still been very much underdeveloped Thus narrowing the gap between physical and social technology will be one of the fundamental tasks toward the end of this century

The present needs of our society for social technology are very strong Social technology—different from those general grand theories which are sometimes pursued in a closed mind study—can only been developed through the practical trials and errors to solve various kinds of social problems In other words it can only been developed through a pragmatic approach for problem solving Then what are the main social needs or background for innovation in this fields of

social technology? The following five factors I think are the most important ones for this

(1) accelerated social change and future shock
    needs for a new dynamic utopian planning
    needs for a future oriented early warning system for our society
(2) increase in the scale and complexity of social problems
    needs for total systems approach in policy making
    needs for big projects long range forecasting and planning
(3) development of new social techniques for problem solving
    operations research systems analysis econometrics simulation etc
(4) information revolution
    information processing machines—computation communication and control
    information science systems engineering
    socio economic indicators
    possibilities of operational approach to largescale social systems
(5) growth of technostructure
    increase in the number of scientists and engineers
    growth of knowledge industries
    educated society

## 2 METHODOLOGICAL FOUNDATIONS OF SOCIAL TECHNOLOGY

(1) Origins
    We have a long history of technological approach to social problems While applied social sciences in such fields as economic policy social planning city planning law etc conform classical origins of social technology those new techniques as operations research systems analysis human engineering econometrics information sciences management sciences etc are the modern origins of social technology (see fig 1)
(2) Various method of social technology can be characterised fundamentally by the following five approaches
    a) systems approach
    b) interdisciplinary approach
    c) scientific approach
    d) operational apporach
    e) normative approach
(3) Social technology includes such operational functions as
    a) forecasting
    b) planning (policy making budgeting)
    c) decision making
    d) organisational control

in various spheres of social problems



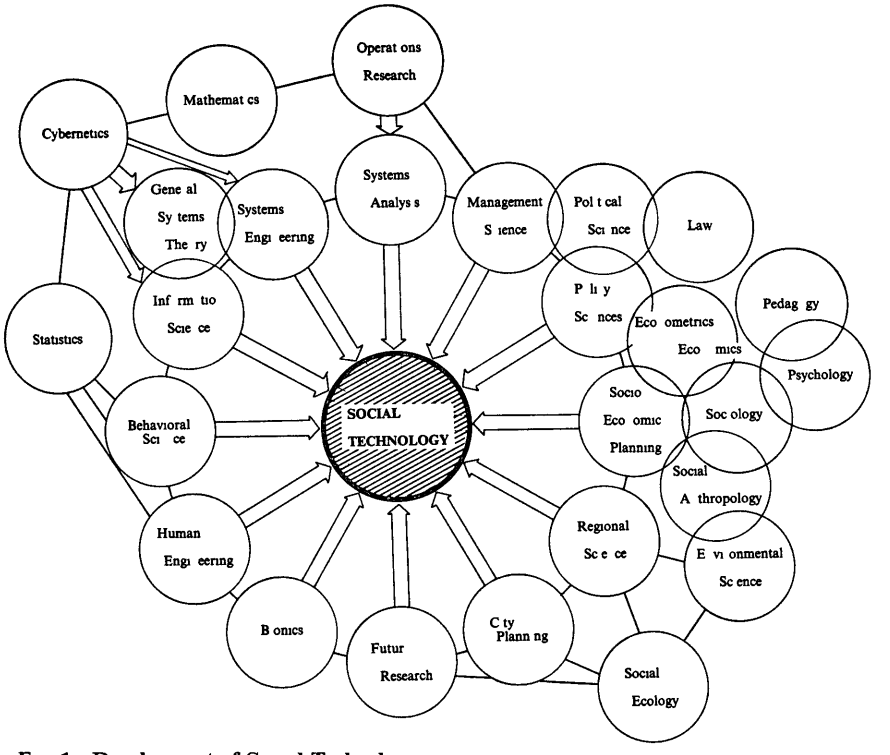


Fig 1 Development of Social Technology

## 3 PLURALISTIC SOCIAL TECHNOLOGY VERSUS MONISTIC SOCIAL TECHNOLOGY

1) Standard faults of ideological utopian thinking
    a) unscientific character of social prediction
    b) static character of social norms (objectives)
    c) ignoring the cost
    d) lack of consistency workability of alternative social systems
    e) poor presumption on human behavior
    holistic social planning
2) On piecemeal social technology
    a) alternative futures
    b) incrementalism
    c) pluralism
    plural decision making centers vs monistic center
    individual preference systems state preference systems zone diversity of sub systems for social choice and control (Market

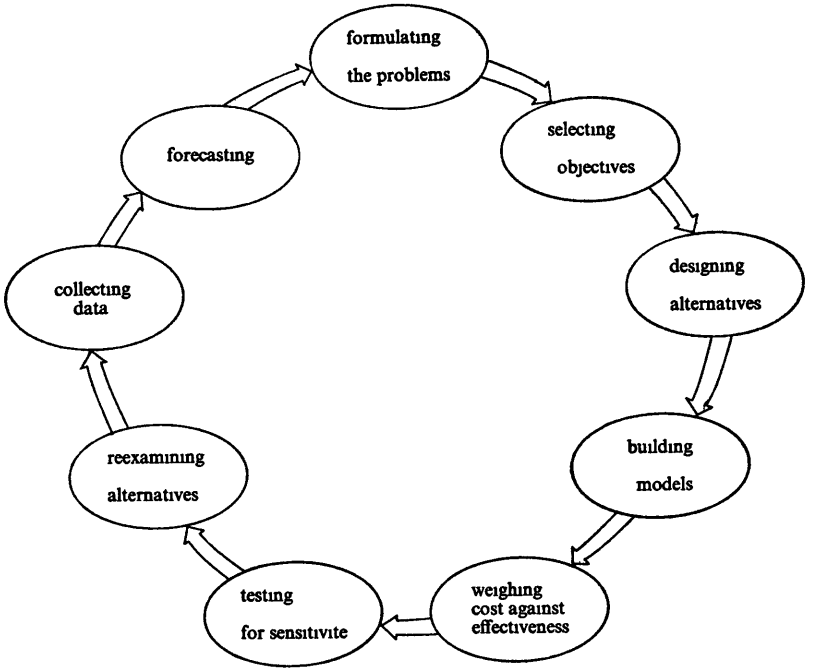


Fig 2 Process of problem solving

mechanism voting system bureaucracy bargaining system community system etc)
planned zone and unplanned zone
trials and errors uncertainty feedback

## 4 SYSTEMS ANALYSIS

1) The elements of systems analysis
   a) the objectives
   b) the alternatives
   c) the costs
   d) a model (or models)
   e) a criterion

## 5 SOCIAL OBJECTIVES RECONSIDERED BEYOND WELFFARE STATE

1) Social objectives of welfare state



   a) stability
   b) equality
   c) affluence
2) new social objectives of the post industrial society
3) some tasks for social innovation
   a) capability of free choice (education for freedom)
   b) future shock and life long education
   c) education for pluralism
   d) quality of informational environment
   e) evolutionary humanism in an age of spaceship earth

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# FORECASTING, ANALYSIS AND DECISIONMAKING

FELIX KAUFMANN
*Long Range Planner*

I FORECASTING

II ANALYSIS

III DECISIONS

1 Some of the decisions which have to be made in business and government and private life are very closely bound up with what we know of the future and with our assessment of the future consequences of the decisions themselves It is the purpose of this investigation to find what kinds of decisions require some idea of the future and what form this idea should or can take

I FORECASTING

II ANALYSIS

III DECISIONS

I FORECASTING

Philosophy of Foreknowledge

Forecasting Methods

Environments

2 A forecast is a statement that something is likely to happen This sounds easy but when we analyze it later we shall see that this simple definition hides a mountain of complexity Many people in business and in government are highly skeptical about forecasts and it would therefore seem reasonable to examine very briefly what can be said for and against them

3 The physicists and mechanistic philosophers of the last century believed that all the future states of the world could be calculated if the present position and momentum of each atom were known Today that seems a bit naive The atom is far more complicated than was believed and for some of the subatomic

# I FORECASTING

## Philosophy of Foreknowledge

## Forecasting Methods

## Environments

particles it may never be possible to know both position and momentum Fortunately for all practical purposes that is totally unnecessary All we need is calculations of the behavior of vast aggregates of atoms and molecules and we are becoming better and better at that The eclipse of the sun which occurred in 585 B C was accurately forecast by Thales of Miletos and our insurance companies can tell us within very narrow limits how many of their insured are going to die during the remainder of 1970 Moreover we are steadily getting better at forecasting all sorts of things

I FORECASTING

Philosophy of Foreknowledge

Forecasting Methods

Environments

4 All our forecasting is done by some variation of five methods which were already known to the ancients and I should like to talk to you briefly about each one of them and give an example which illustrates their use

The classical example for the success of the deductive method is thermodynamics From two laws of nature the first and second law of thermodynamics J Willard Gibbs at Harvard in the last century derived a set of equations which made it possible to calculate the energy changes in all chemical and physical chemical reactions and to predict therefore in which of a number of alternative directions a reaction would go Every forecaster makes use of the deductive method to some extent if only to establish the outer limits to his range of possibilities by the laws governing the particular universe he is dealing with

The laws themselves are in most instances arrived at by induction which can be defined as the expectation that what has always happened will probably happen again under the same circumstances Our expectations of the future are very much influenced by past experience

The intuitive method may well be historically the oldest ancient forecasters were believed to be divinely inspired To this day many have a blind faith in fortune tellers or in experts and one of the best known methods for collecting and coordinating the opinions of many experts is named after the Oracle of Delphi



which was famed throughout the ancient world for the shrewdness of its forecasts

If the Oracle of Delphi serves as the prototype for intuitive forecasting the Hebrew prophets are the paradigm of normative forecasting Instead of making guesses of what the future might hold they laid down what ought to be done Normative forecasting is prophetic it arises from the perception of existing shortcomings or needs Let me take Thomas Edison as an example He sent an electric current through a carbon filament and noticed that it gave a much brighter light than the existing gaslights that were in every home He encased it in a glass bulb removed the oxygen which would oxidize it and he had made an invention But since nobody had electricity in their house it could not really fill the need So he went to work and he developed an electric generation and distribution system which is to this day named after him in many cities in the United States and Italy

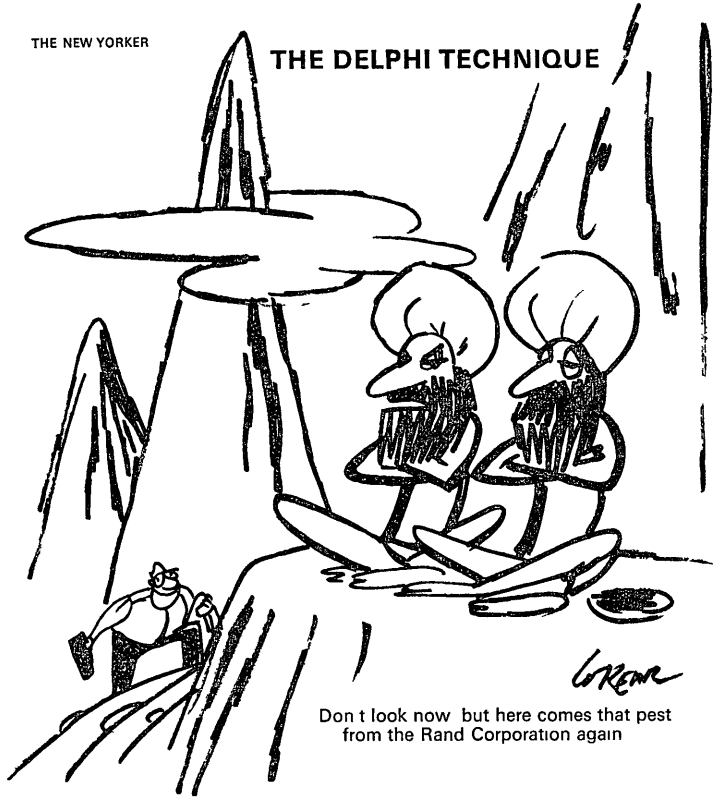
## SYNOPSIS OF FORECASTING METHODS

| METHOD | LINEAR | MULTIDIMENSIONAL | |
|---|---|---|---|
| Deductive | Laws of logic maths nature economics, etc | Growth law derivation | |
| Inductive | Analogy History Periodicity | Trend determination and correlation | |
| | Intuitive | Brainstorming Synectics Expert opinion | Approaches to consensus |
| | Normative | Need analysis Invention Postulation | Systems design |
| | Creative | New Applications Alternative futures Scenarios Science fiction | Model construction |

5 Normative forecasting can be creative and often is But it need not be In theory at least it could be based on a mechanical process for analyzing problems and matching them up with applicable solutions What I would like to call creative forecasting is based on processes that are not mechanical and cannot be

mechanized It might be analogous to finding a solution to a problem no one knew existed Or a radically new application of an existing principle

One method of dealing with the future attempts deliberately to create scenarios which are different from the present so as to get a grip on details and particulars which would not be considered worth pursuing by systematic analysis Science fiction is a scenario system and its best practitioners belong to the most successful forecasters H G Wells for instance accurately forecast World War I trench warfare tank warfare Zeppelin air raids paratroopers supersonic planes with swept back wings organ transplants and nuclear war




Don t look now but here comes that pest from the Rand Corporation again

6 In case it isn t perfectly clear to everyone how the Delphi method works here is an example of it in action

7 Trying to cope with all environmental changes simultaneously would require a greater information capacity than any operating computer or any living person has It is easier to break the job down into manageable portions and to treat environments separately

8 Some environments are relatively stable That means of course that these environments change slowly so that the change is perceptible only over decades



## I FORECASTING

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Forecasting Methods

Environments

**ENVIRONMENTS**

Physiography

Climate

Human Nature

National Character

Social Institutions

**I FORECASTING**

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Sometimes there seems to be none over centuries The forecaster can concentrate on those environments which seem to be changing drastically from year to year

**ENVIRONMENTS**

Physiography

Climate

Human Nature

National Character

Social Institutions

**FAST-CHANGING ENVIRONMENTS**

Social

Economic

Political

Technological

9 The fastest changing and the most important are these four The last of these has attracted the most attention but forecasts in that field are totally mean ingless unless they consider the other three environments in which these changes take place Especially the social environment is basic to all the three others Eco nomic and political forecasts are very much contingent on the social environment

Technological forecasts in their turn have to lean very heavily on the social and the economic sometimes also on the political

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II ANALYSIS

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10 I am going to use the word Analysis in a new though not entirely arbitrary sense In the 17th century Newton and Leibniz independently developed differ ential calculus to uncover the time dimensions of natural processes At the present moment there is an effort going on all over the world of which this Future Research Conference is symbolic to uncover the time dimensions of the complex interaction of man made processes with each other and with natural processes This is what I would like to call Analysis here It is not yet a calculus it is not even a science It is about to be developed into an art which will slowly grope its way towards becoming more scientific

The subject is vastly more complex and difficult than any other methodology or discipline that is now being studied And it is not going to be solved even by a Newton or a Leibniz working by themselves It is a hopeful sign however that systematic investigation of the future is now attracting some of the best minds from all over the world A set of common concepts in a unified language (as exists for instance in Science) will greatly improve communication among the workers in this field This presentation is being made in the hope that it will aid a little bit in this direction

11 I shall try and deal very briefly with some of the standard analytical tools in handling forecasts Suppose we have a forecast based on any of the methods discussed before Before launching it into an expectant world we should project it to some analytic procedures lest we make complete fools of ourselves

Many forecasts are printed which have glaring internal inconsistencies For instance people are very disappointed to find that research expenditures by the United States Government are not keeping on growing at the same exponential rate as in the past Actually it was predictable years ago that they would taper off long before the point where they overtake the federal budget

Where a forecast does not confine itself to a single strand of future develop ment but encompasses several related areas the opportunities for internal in



ANALYTICAL TOOLS

- Internal Consistency
- External Incompatibility
- Recycling Techniques
- Systems Analysis
- Communication

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consistencies grow geometrically Very few such forecasts are free of internal errors One advantage of the scenario technique is that it uncovers internal inconsistencies of this nature more easily than systematic analysis

Occasionally scenarios also lead to the discovery of incompatibility of a forecast with other considerations One frequent source are two opposite assump tions about human behavior The first assumes that human behavior will con tinue to follow the same path as in the past regardless of irrationalities thus compounded The second one equally false assumes that human behavior is totally rational and will in the long run optimize its own interest

Apart from the difficulty of defining such interests (short term long term individual national humanity s?) both assumptions are of course wrong

Forecasting of stock movements by charts is an example of a forecasting technique which falls into both errors simultaneously On the one hand it is as sumed that all the fundamentals of a stock are already reflected in the value placed on it by the investing public (which assumes better information about the corporation and the environment than is actually available to anyone) and on the other hand it is postulated that past chart configurations and their con sequences can be a guide to the consequences of present chart configurations although this assumes that the behavior of the investing public is bound by im mutable laws which negate any rational choice

I would like to propose a *hypothesis of limited irrationality* which states simply that while the behavior of human groups is never wholly rational its irrationality too is limited

These are not the only sources of external incompatibilities of course One of the purposes of analysis is to uncover situations in which development and trends which were left out of considerations may turn out to destroy the validity of a forecast

Perhaps the most powerful tool for the elimination of errors by the analyst is recycling The forecast based on one of the methods should be recycled in the light of as many other methods as possible The deductive recycle will ask what the forecast looks like in terms of limiting factors Does it conflict with laws or

total resources? An inductive analysis will ask how a forecast compares with experience Are there precedents for it? Analogous situations? Would it require an abrupt reversal of trend? All these might be indications that more intensive analysis is needed Intuitive analysis will ask Does the forecast look right? What do experts think of it? Doubly careful analysis is indicated when experts are bewildered Normative analysis is a good test for uncovering excessive ir rationality The forecast can be tested against what would seem desirable or necessary If there is a large gap reexamination is probably in order

Next the forecast can be recycled between environments Here the question that must be answered is not only How does this forecast fit in with what we know of the other environments? But in addition What impact will this fore cast have if it comes about on each of the environments and how ill the reac tion affect the forecast in turn? Technological forecasts especially turn sour if they rest on technological feasibility alone without considering their social acceptability or economic desirability A good social and economic forecasting capability coupled with moderate technological knowledge usually is preferable for technological forecasting to brilliant technological understanding coupled with moderate let alone poor social and economic insight

The time dimension of a forecast is crucial to its value Many intuitive normative or creative forecasts are wide of the mark in this respect It helps to remind oneself that very sudden change is often incompatible with deductive and inductive considerations Arthur C Clarke has said that experts tend to overrate what can be done in a few years and to underrate vastly what can be done in ten or more Knowledge of any source of systematic error helps of course to correct it

Any quantitative treatment provides a handle for analyzing and checking a forecast The typical analytical mind feels happiest with figures and figures can be indefinitely recycled and probed for consistency and accuracy Equations and curves can be developed and be subjected to further analysis Deductive analysis might ask Why do the curves have this shape? Inductive analysis would put such questions as What causes irregularity in the curve at this particular point in time? This may unearth new laws and new trends and the recycling and examination can begin anew Such recycling of quantitative aspects of a fore cast is not just an academic exercise but a step which no conscientious analyst can afford to omit But as with most other good things there can be and has been too much of analyzing and recycling quantifications The mathematically oriented analyst has a tendency to neglect other important recycling approaches in favor of this one But we will return later to some aspects of this which have been suffering from neglect

12 When 150 years ago N L Sadi Carnot wanted to deal with the difficult problems of energy transformation before the mechanical equivalence of heat had been demonstrated and long before conservation of energy had been recog nized as a natural law he chose to deal with a simplified closed system and his success laid the foundation for thermodynamics

This is the classical example for systems analysis In ignorance of the general laws operating in our universe we isolate a limited system hopefully large enough to include all parts relevant to the analysis but small enough to be comprehended and analyzed and try to understand it in detail



## ANALYTICAL TOOLS

- Internal Consistency
- External Incompatibility
- Recycling Techniques
- Systems Analysis
- Communication

| SYSTEMS ANALYSIS | SYSTEMS ANALYSIS |
|---|---|
| Advantages | Limitations |
| Manageability | No system truly closed |
| Control of relevance (by choice) | Too many variables |
| Heuristic value (even if too small) | Simplifying assumptions unwarranted |
| Demonstrability of insights | Analytic skills of high order needed |
| Amenability to Analysis | |

13 The analysis of even a very small system requires an unusual combination of skills In the few institutions which dispose of such skills unfortunately analytical specialists greatly outnumber knowledgeable generalists and the analyses show it Although the trend has been in the direction of mathematical analysis the most important criteria for success are the systems analysts ability to

a Choose a relevant closed system
b Recognize essential variables
c Recognize blind alleys long before he comes up against the wall

Systems analysis is an indispensable tool of the analyst Where the forecasting universe is too large breaking it down into several related systems and analyzing each can be a valuable technique The difficulty lies in choosing the systems Operations researchers have a preference for systems in which all the variables can be determined and calculated This is analogous to looking for one s keys under the street lamp not because one has lost them there but because one has despaired of finding them in the dark The greatest contributions are often made by systems which may be incalculable but which are easy to grasp intuitively or normatively Sherlock Holmes used to ask himself what he would do in the

other person s position with the information that he had This enabled him to penetrate what were insoluble mysteries to the other characters in the story

## ANALYTICAL TOOLS

- Internal Consistency
- External Incompatibility
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- Communication

14 The god Apollo gave Cassandra Princess of Troy the gift of making in fallible forecasts but as a terrible punishment withheld from her the ability to inspire belief Forecasters who are habitually disregarded tend to share Cas sandra s despair They should remember that Apollo is the god of light and reason not of mystic vision and that his gift has to be earned by lucid analysis which can be made enlightening and convincing

Human nature being what it is some forecasts need little documentation while others tend to go unheeded even when they are accompanied by overwhelming evidence It is part of the forecasters task to know how much documentation is needed to support a forecast in a given decisionmaking situation If the forecast is highly plausible or the decision based on it very palatable little substantion may be needed The real problem of Cassandra was not that she lacked proof but that her predictions of doom were extremely unpleasant to listen to and to

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act on Such situations put the communications skills of the analyst to their severest test

15 One very crucial analytical consideration is the utility of forecasts and forecasting Are they good? What can be done to make them better more useful? This is a manysided problem and we shall look at it from some of these sides

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**PSEUDO-CRITERIA FOR A 'GOOD' FORECAST**

Correctness (Will it really happen?)

Outcome (Did acting on the forecast prove advantageous?)

Originality (Does it uncover an aspect of the future that had not occurred to others?)

16 If a poll were taken on the question What makes a forecast good? the majority of replies would fall into one of these three categories I hope to convince you that all three are entirely unrelated to forecast utility

Take the criterion of correctness Ancient myths abound with examples of people who sealed their doom by acting on correct forecasts Oedipus and his parents and Macbeth could be cited Later I also hope to give you a contempo rary example

This leads us to suspect that maybe we should judge a forecast by the outcome —the result of heeding it or not

A few years ago the Federal Treasury was sued by a man in San Francisco for 10% of the value of a huge heroin shipment worth several million dollars which had been confiscated from an incoming ship in San Francisco harbor He pro duced a copy of a letter in which he had tipped off federal agents about the concealed narcotics on the ship and claimed 10% of their value as his informer s fee Contesting the claim the government produced letters received from him over several years in which he had made exactly the same forecast about every single ship coming into San Francisco from abroad Customs officials said they had ignored his tips and gave evidence that they had raided the ship as a result of information obtained from quite another source Question Was the forecast under litigation a good forecast? By the way the Court awarded the plaintiff his full informer s fee of several hundred thousand dollars

This actually happened It would be easy to invent even more absurd instances to dispel the notion that forecast utility should be judged by outcome

The development of a good forecast swallows up a great deal of effort and money If the final result turns out to be what top management thought in the first place or what could be read by everyone in a widely distributed journal

disappointment is understandable But it is misplaced The task of the analyst is not to come up with something nobody else thought of but to explain which of the many conjectures that are voiced and printed happen to be right and why

| PSEUDO-CRITERIA FOR A GOOD FORECAST | CRITERIA OF FORECAST UTILITY |
|---|---|
| • Correctness (Will it really happen?) | Functionality |
| | Relevance |
| • Outcome (Did acting on the forecast prove advantageous?) | Completeness |
| | Precision |
| • Originality (Does it uncover an aspect of the future that had not occurred to others?) | Confidence |
| | Analysis |

17 With your permission I would like to cover very quickly what I consider to be the true criteria of forecast utility because much of what follows will deal with this subject and exemplify it in detail I will assume that forecast utility has meaning only in relation to planning or decisionmaking and can be evaluated only in terms of the effect on the plan or the decision Based on this assumption we arrive at these criteria The effort which goes into developing the forecast must be *commensurate* with the plan or decision which depends on it It happens only too often that more money is spent in developing a forecast than the amount which actually hung on the decision Conversely if the forecaster is unaware of the momentous nature of a decision his effort may fall far short of what is called for Secondly forecast utility depends on the degree to which it affects the plan or decision All else may be of interest but if it is not *relevant* it will have no utility The forecast should cover *all* relevant aspects of the future which can be dealt with in the time available and with means commensurate to the importance of the decision The forecast should aim at the maximum *precision* which is needed for the plan or decision in question Time considerations are especially crucial *Confidence* is a cardinal aspect of utility and we shall deal with it in much greater detail later Lastly every forecast should be accompanied by an *analysis* Analysis fosters a new attitude to present decisions by shedding light on their future consequences This attitude will make for better decisions even if the future should remain veiled It matters less that the forecast is right than that the analysis is good Some of you will know the story of Jonah who was sent to prophesy the destruction of the Assyrian capital Niniveh as a punishment for its sins Niniveh repented and was spared The forecast turned out to be wrong but the analysis saved the city A forecast has utility in proportion to the understanding it provides about the future When it does that it performs a useful function even if it turns out to be wrong When it misleads its utility is negative even though the forecast is literally correct



# II ANALYSIS

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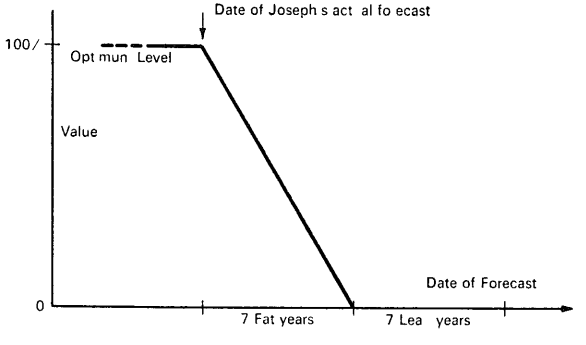
## Limitations

18 Take a few examples of actual forecasts to illustrate some of the parameters of utility One of the oldest forecasts of which records tell was made by Joseph to the Pharaoh of Egypt about 2000 B C He predicted that there would be a series of seven fat years with excellent harvests which would be followed by a dismal series of seven lean years with practically no harvests at all Joseph followed up his prediction with a strategic analysis of the decision to be made He suggested to the pharaoh that the Egyptian government should maintain an incentive to crop production during the fat years by buying up all surplus grain and other storable commodities During the subsequent famine these would save the population of Egypt and any surplus could be sold at a profit to neighboring lands also stricken by famine

19 I d like you to look at the utility of this forecast in terms of the moment in time when it was made At the beginning of the seven fat years (or any time before) it had maximum utility because it allowed accumulation against the famine for a full seven years At the beginning of the lean years the utility of the

VALUE OF JOSEPH S FORECAST AS FUNCTION OF DATE OF FORECAST



## II ANALYSIS

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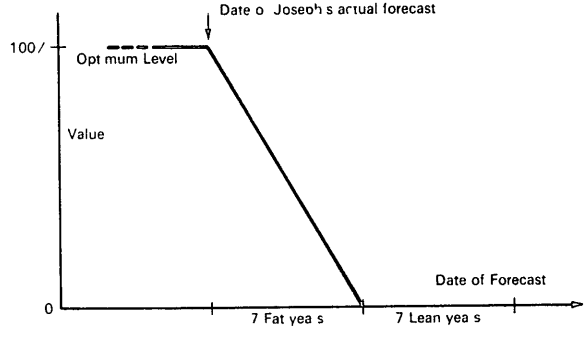
forecast would have been zero because nothing further could have been done to avert the famine During the first seven years the drop in utility is largely pro portional to the time elasped

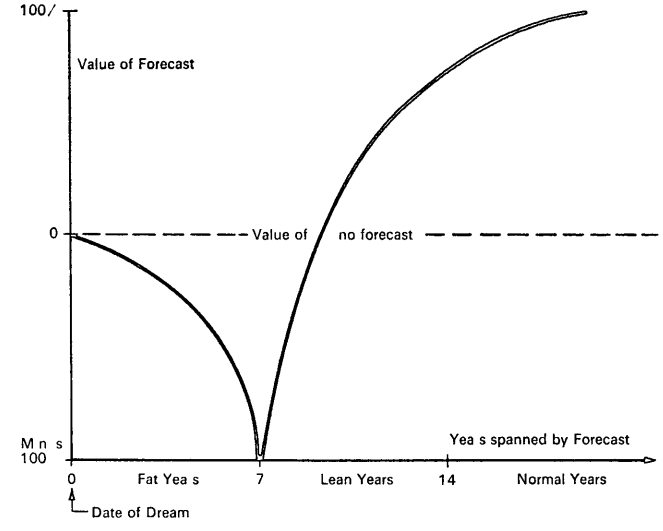
20 Now I would like you to look at it in a completely different way We won t assume that Joseph could see ahead as long as he actually did Instead we will plot the utility of a forecast in his situation against the span of the vision It is immediately clear that had he been able to see ahead only seven years or less his forecast would have compounded the subsequent disaster Certainty of several years glut ahead would have knocked the bottom off agricultural prices and would have been a disincentive to production I am not suggesting that the government like the U S government would have gone to the length of paying its farmers for leaving their fields idle but even without that they would have relaxed their efforts even more than if the possibility of a reversal had to be reckoned with A seven year forecast in this case would have done maximum mischief though correct

VALUE OF JOSEPH S FORECAST AS FUNCTION OF DATE OF FORECAST



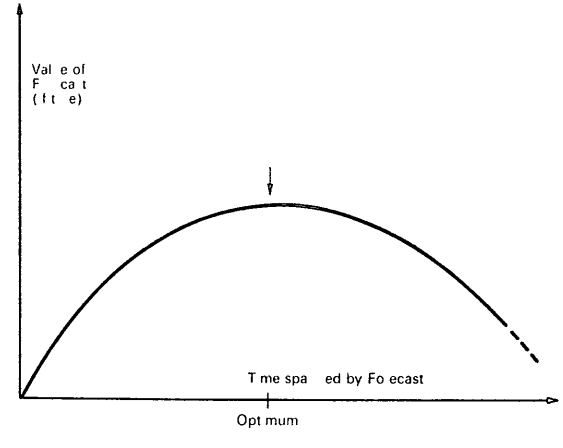



VALUE OF TIME SPANNED BY FORECAST

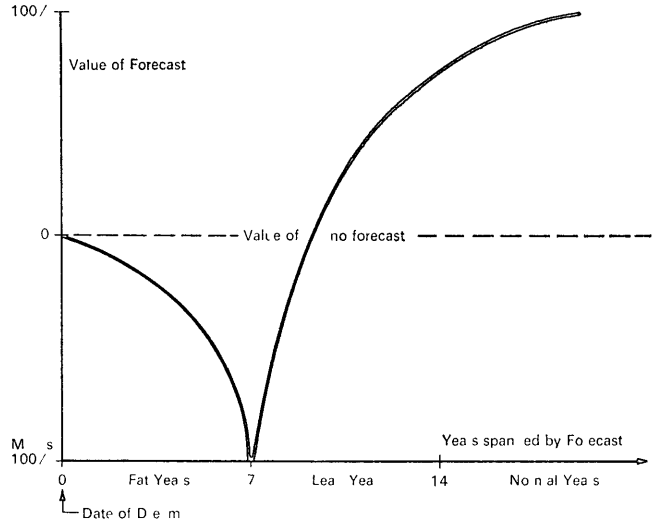



For each time period of vision beyond the seven years the importance of producing and storing surpluses would have become more obvious Had Joseph foreseen only the next fourteen years in other words had he been uncertain when normalcy would return surplus storage might have gone on too long meaning that people would deprive themselves without commensurate gain at the end of the period Consequently the full utility of the forecast is not reached until a definite period of normalcy is included at the end of the fourteen years

NORMAL VALUE OF FORECAST (IF TRUE) WITH TIME SPAN

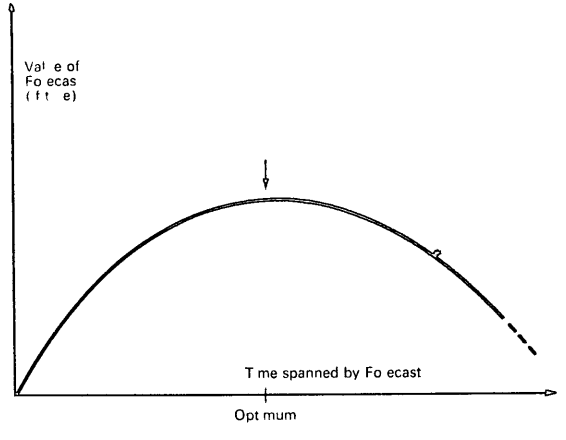


VALUE OF TIME SPANNED BY FORECAST



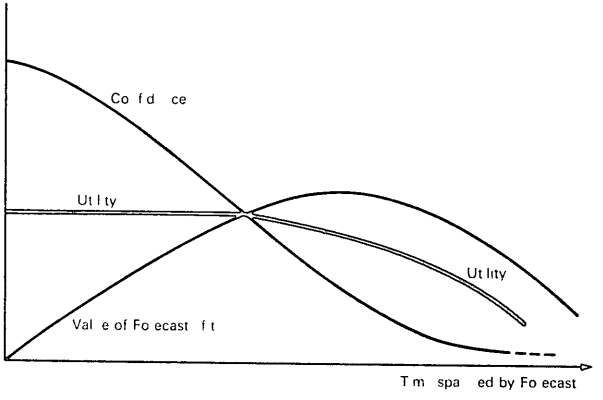

21 The curve on the right is fairly abnormal Even if we assume like the Pharaoh that the forecast is true utility normally varies with time span more as you see on the left The rising part of the curve reflects the fact that longer range forecasts are both more difficult and more useful than shorter ones but beyond a certain point the value of spanning a long range declines both because a deci sion can be postponed without opportunity cost and because the postponement even allows one to take full advantage of any developments in the meantime

NORMAL VALUE OF FORECAST (IF TRUE) WITH TI ME SPAN



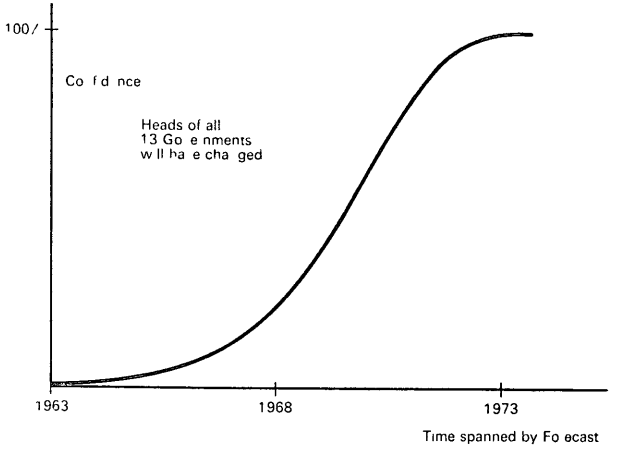



UTILITY OF FORECASTS AS A FUNCTION OF TIME SPAN

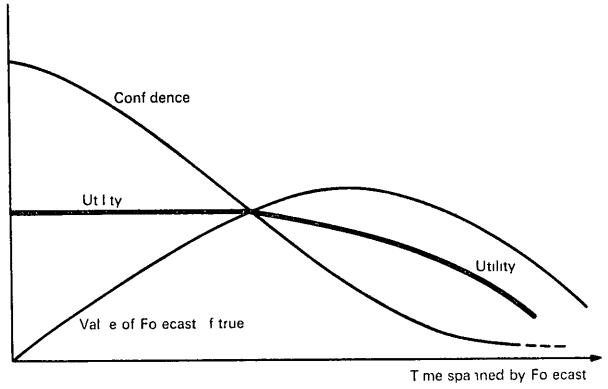



22 It is of course unreasonable to speak of the value of the forecast if true in real life the true utility function will be modified by the fact that confidence in the forecast diminishes fairly drastically as its time span increases The true utility therefore will be the resultant of the confidence value and the value of the forecast if true as shown on the right What this means is that short range forecasts have higher utility than long range forecasts and very long range forecasts have practically no utility at all Well as a matter of practical experience we know that we are more interested in weather forecasts for the day than for the week in stock tips for tomorrow than for next year and in what a cigarette does for us now rather than in thirty years time Our intuitive perception of utility coincides with the mathematical derivation of a concept

CONFIDENCE INCREASES WITH TIME SPAN

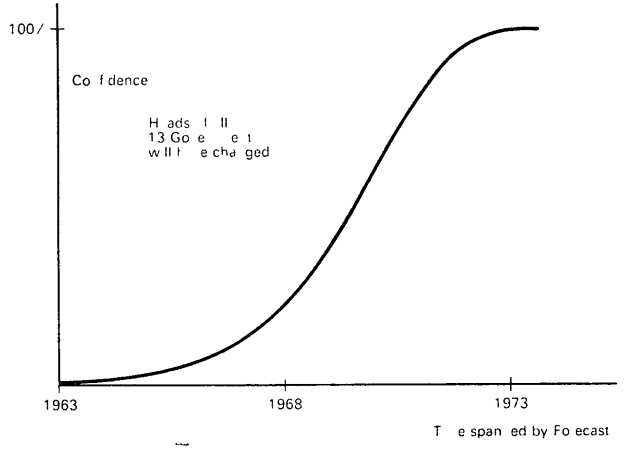


UTILITY OF FORECASTS AS A FUNCTION OF TIME SPAN



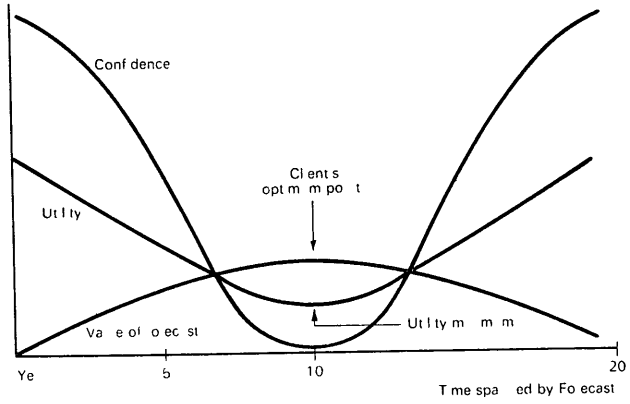

23 I just like to give you a few more exceptions to the normal curve on the right At a seminar at Hudson Institute in 1963 the audience was startled by the prediction that within 10 years the heads of government of all the nations that had been discussed would change The nations had been United States United Kingdom France Spain Portugal West Germany East Germany USSR People s Republic of China Nationalist China North Vietnam South Vietnam and India But when the analysis was given the forecast was believed The President of the United States was prevented by the Constitution from being in power longer than till January 1973 The rulers of all the other countries looked fairly irremovable at the time except that in November 1973 the youngest of

CONFIDENCE INCREASES WITH TIME SPAN






UTILITY OF U S CIGARETTE CONSUMPTION FORECAST

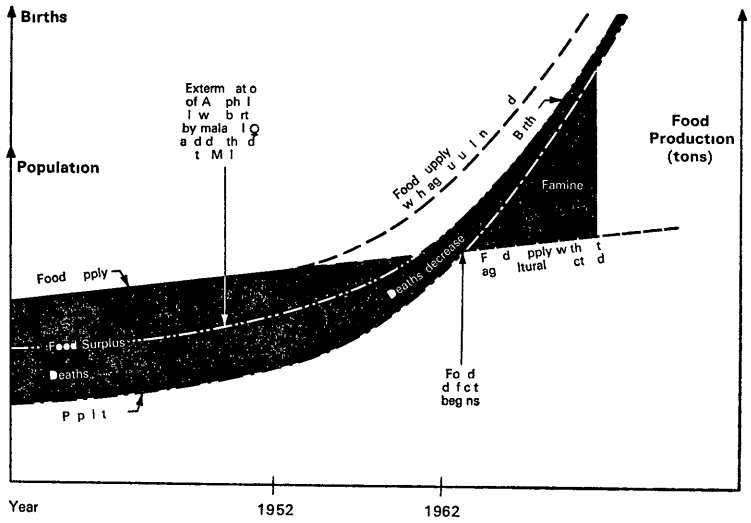



them Ulbricht would be 80 and Adenauer the oldest would be 93 Today only Franco Mao Tse Tung Chiang Kai Shek and Ulbricht remain with three years to go But I would not change the prediction Anyway it is clear that confidence in a forecast of this type has the opposite kind of a curve against time span as you see on the right

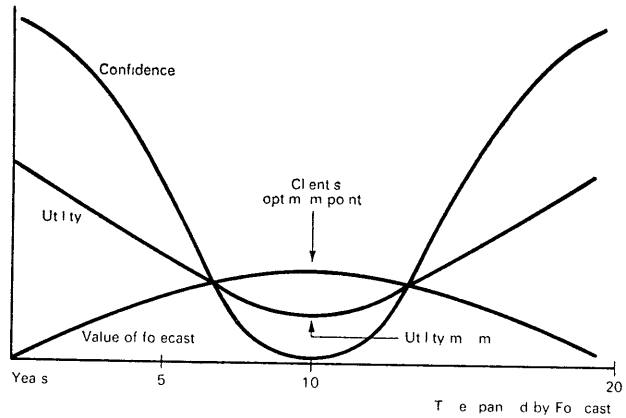
24 I will give you one more example of an anomalous change of confidence with time span About six years ago a consulting group was approached by an investment banker who wanted to buy a study of what would happen to the cigarette industry in the next 10 years as a result of the Surgeon General s Report It was quite clear to us at the time that within the next five years the cigarette consumption pattern of the American public would change minimally and we also felt very strongly that after 20 years a very definite trend away from tobacco smoking would be established Our trouble was that we were not quite sure whether it would manifest itself already in 10 years time the time span in which the client was interested Since we realized that his utility curve had a minimum at just that point we regretfully had to tell him that we couldn t help him

25 Here by contrast is a forecast that was relatively easy to make In the early 50 s I was a consultant to the World Health Organization rendering technical assistance to the governments of Pakistan India and Ceylon to enable them to set up manufacture of insecticides in their own countries for use in their disease control programs In negotiating technical assistance contracts with these governments it was my duty to insist on a clause restricting the use of insecticides produced in the factories built with our help to disease control most importantly malaria and to a lesser degree typhus In effect that meant that the governments were precluded from using these insecticides for agricultural purposes Since most of them were very short of foreign exchange this meant that they could not obtain sufficient insecticides for crop protection In 1952 I made a report to the World Health Organization asking them to remove the

10 YEAR PREDICTION OF FAMINE IN CEYLON MADE IN 1952
(unless insecticides are used for agriculture too)




UTILITY OF U S CIGARETTE CONSUMPTION FORECAST




contractual restriction on agricultural use I explained that in Ceylon specifically we would be causing famine within 10 years by such insistence The chart summarizes the mechanism

This forecast like Joseph s came at the right time for action Like Joseph s it was also fulfilled Ceylon, which in 1952 was a food exporting country had



its first famine in 1962 The World Health Organization took the view that agricultural matters were the business of FAO and that the charter of the Economic and Social Council of the United Nations precluded it from meddling So here we have an example where forecast utility was zero despite confidence in the analysis It is however unusual for a forecast to be firmly believed and yet not acted on

## II ANALYSIS

The Concept
Analytical Tools
Forecast Utility
Confidence
**Precision**
Heisenberg Effect
Limitations

26 The commonest cause of reluctance to act on a forecast is lack of confidence

II ANALYSIS

The Concept
Analytical Tools

$5 < p < 1$

Forecast Utility

$\text{Confidence} = p$

Confidence
**Precision**
Heisenberg Effect
Limitations

27 We introduced a forecast by saying that it was a statement that something was likely to happen Likely means probable and probable means that the probability of its happening is somewhere between one half and one The value of that probability p is what we call confidence

28 A little analysis will show that there are two different kinds of confidence

## CONFIDENCE

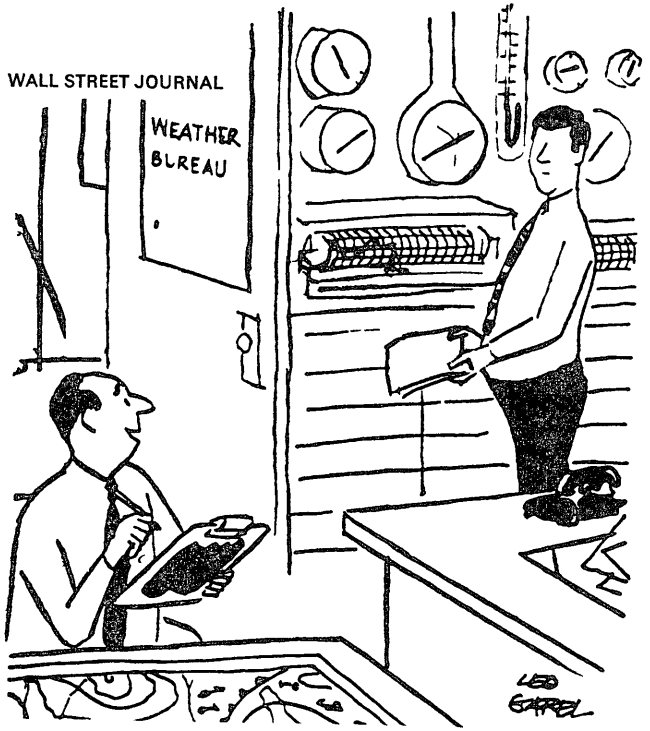
$5 < p < 1$

Confidence = p

Probabilistic

Psychological

The first one gets its name from the definition on the left It can be calculated in various ways deductively or inductively The second which we call psychological confidence is the subjective confidence of the recipient in the forecast




CONFIDENCE

Probabilistic

Psychological

I figure there s a 40% chance of showers and a 10% chance we know what we re talking about

29 The slide on the left illustrates this difference

30 Precision to the Analyst is what honor used to be to the aristocrat Like honor it is also a very complex concept

31 Here are a few of the parameters of precision The first specificity concerns the subject matter of the forecast



## II ANALYSIS

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

## II ANALYSIS

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

## PRECISION

Specificity

Quantification

Time

Cumulative Probability

Timing

## PRECISION

Specificity

Quantification

Time

Cumulative Probability

Timing

**THE COMMONEST CAUSES OF LACK OF FORECAST UTILITY**

- The forecast does not answer the question that has been asked
- The forecast leaves the most important part of the question unanswered
- The forecast answers a question that has not been asked

The forecast answers the question that has been asked but not the one that **should** have been asked

32 This is crucial Forecasters rarely get asked the right question It usually takes a number of discussion rounds between forecaster and recipient to work out what the question should be To give a simple example from business management asks for demand for a certain product five years hence and receives a forecast of the market for an article with the properties specified Management makes the tacit assumption that if the demand is great the product must be profitable and decides to develop it So do eighteen other mostly bigger com panies The result is financial disaster The forecaster is not to blame He was asked for demand figures not market opportunities In the particular instance he assumed the company had a patented accessory to the final product which each manufacturer would have to use If management had not been interested in demand but in market opportunities they should have told the forecaster that they were really considering manufacture of the whole product for which they supplied a part

**PRECISION**

Specificity

Quantification $5 < p < 1$

Time Confidence $= p$

Cumulative Probability

Timing

33 The more precise a forecast is the less probable that it will come about exactly as forecast Thus probabilistic confidence and precision have an inverse relationship The greater the precision the less the confidence

There is a current vogue among professional forecasters and forecasting services for making high confidence forecasts at the cost of precision This is called hedging The Oracle of Delphi was renowned for it When Croesus King of Lydia wanted to attack the Persian Empire across the river Halys the oracle told him that in crossing the Halys he would destroy a great empire He attacked and his own Lydia became a satrapy of Persia Modern economic and market forecasts usually follow the Delphic tradition

34 Time precision is the most crucial of all forecast variables We have seen a few illustrations of its importance before Here I would like to dwell briefly on two others

35 In making a forecast we are frequently compelled to neglect possibilities which would drastically change the outcome but which are very unlikely to occur in a given year We should be mindful however that if in a given year we neglect a great number of such different factors the chance that one of them will nevertheless vitiate the forecast is quite substantial Usually by the way



**PRECISION**

Specificity

Quantification

Time

Cumulative Probability

Timing

**PRECISION**

Specificity

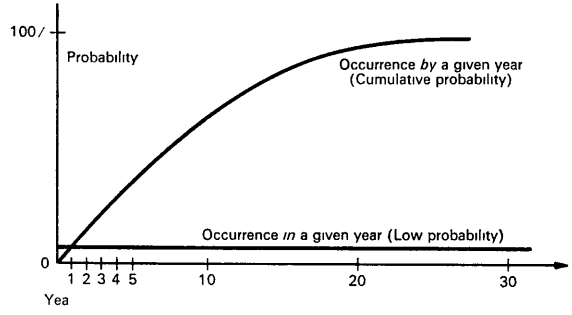
Quantification

Time

Cumulative Probability

Timing

**TYPICAL CUMULATIVE PROBABILITY CURVE**




the unlikely contingency that occurs is one that was never even given a thought in developing the forecast

When it comes to considering a particular contingency that has a low prob

ability of occurring in any one year the mistake is frequently made to ignore it even in long range forecasts The curve on the right shows that an unlikely event becomes overwhelmingly probable if the probability cumulates over a longer period

More important perhaps than all other considerations in determining the utility of a forecast is timing To tell a roulette player that the chances are better

WALL STREET JOURNAL

Thanks just the same Charley but I can t afford another tip on the market

**PRECISION**

Specificity

Quantification

Time

Cumulative Probability

Timing



than 20 to 1 that the number 23 will come up in the next hour is totally useless to him Most stock market forecasts are just about as useless I have a little scenario about a man who is given an April 1971 copy of the Wall Street Journal Most sophisticated people present company not excluded would probably be ruined by such a windfall We don t have time to go into the whole scenario but I will be glad to discuss it later with anyone interested

36 In any case tips on the market can turn out expensive if they do not provide the right timing as well as the right stocks

## II ANALYSIS

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

37 Werner Heisenberg pointed out that if someone wanted to forecast the position of an electron he would fail because the very act of measuring the position or speed of the electron would change its course There are other instances where the forecast itself has an influence on the outcome

II ANALYSIS

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

**FORECASTS**

Self-reinforcing

Self-defeating

38 In Macbeth we have an example of a self reinforcing forecast The pro

phecy that he will be king motivates him to take energetic steps to that end It is a frequently cited observation also that people who expect the best or worst of others usually prove right There are a number of such self reinforcing mechanisms

**FORECASTS**

Self-reinforcing

Self-defeating

**SELF-DEFEATING FORECASTS**

- Unfavorable, inducing improvements of outcome
- Favorable, reducing needed efforts
- Demand and Supply Forecasts

39 Jonah s forecast which we have already mentioned is an example of the first type Hopelessness can be paralyzing but on the other hand, people rarely exert themselves greatly for what they believe to be inevitable

We all know many instances in which forecasts in a demand/supply situation have a strong influence on the future demand and supply I would like to discuss only one example which is I believe of great concern to all of us From the mid 50 s to the mid 60 s we all heard dire forecasts of world famine These spurred very energetic efforts at food production and at population control both of which have been as successful as few dared hope There is a serious danger at this point that publication of this success which in the long run spells lower food prices will dampen the efforts of food producers and weaken the arguments of population controllers sufficiently to make the original forecasts true

## II ANALYSIS

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

40 Lest you be given the impression that I am trying to oversell Analysis I would like to add a few words of caution about the limits to its perfectibility and about its applicability even when it is perfect



## II ANALYSIS

**THE LIMITATIONS OF ANALYSIS**

- Ignorance of the Present

The Merciful Veil of Fate

Bad Outcome from Good Forecasts

A Forecast is not a Decision

The Concept

Analytical Tools

Forecast Utility

Confidence

Precision

Heisenberg Effect

Limitations

41 The last chairman of the Federal Reserve Board publicly admitted that the Federal Reserve Board usually had to act more or less in the dark because it had no way of knowing the environment in which it made decisions Its knowledge of the present was four months behind Usually people in business and in government have to make important decisions with even less knowledge of the present environment than is available to the Federal Reserve Board

Not that ignorance is necessarily all to the bad The phrase the merciful veil of fate was coined by an economist to describe the situation of the economically underdeveloped countries which would be discouraged into paralysis if they realized the full extent of the difficulties facing them in their effort to industrialize At least through ignorance of some of the difficulties a few of those trying may make it If it were not for the merciful veil of fate none would

Needless to say moreover doing all the right things in the light of what can be known does not always lead to a good result And sometimes it needs extra ordinary vision and courage to go counter to analysis

I would like to give you one historical example When in 490 B C King Darius sent a Persian Army of unprecedented size to punish Athens both forecast and analysis would have made surrender seem advisable The oracle of Delphi was known to be pro Persian and would certainly have counseled sur render whenever their armies had met the Greeks had suffered defeat at the hand of the Persians the Persian Army that had landed near Marathon out numbered by more than 10 to 1 the small force that the Athenians and their Plataean allies could muster between them The Persians had 100 000 foot soldiers and 10 000 cavalry as well as archers while the Greeks had no horses no archers and only 10 000 men in all Though the Athenian leaders may not have known it the Persian commanders had orders from their king to destroy the town and bring all Athenians back to Persia as captives If Athens had surrendered the marble temples which grace the Acropolis today would never have been built Phidias and Praxiteles would never have created their immortal sculptures none of the great Greek tragedies and comedies would have been written or performed there would have been no Golden Age of Pericles and no

historian of the stature of Thucydides to record it No Socrates would have taught in the marketplace and without Socrates there would have been no Stoicism no Epicureanism no Plato no Aristotle and the whole of western philosophy would have been different if indeed it ever came into existence at all Without Aristotle Alexander the Great s conquests would not have hellenized the antique world Our cultural heritage would be poorer by far

The Athenians acted as if all this had been part of their analysis After wait ing in vain for five days for an attack on their own position they ran one mile towards the Persian army and drove it into a swamp and into the sea Did the Athenians have an inkling what was at stake when they decided against all odds to fight this battle?

Aeschylus one of the greatest poets in world literature and the originator of theater as we know it fought in that battle as a young man When he died in Sicily forty four years later having been crowned with all the glories and honors Athens could bestow on her great playwrights he asked that his gravestone should say only He fought at Marathon

**I FORECASTING**

**II ANALYSIS**

**III DECISIONS**

**III DECISIONS**

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions

42 This leads us to decisions of which we will discuss only four kinds

**TACTICAL DECISIONS**

- Respond to present, not future
- No time, or need, for analysis
- No retrospective analysis
- Hence assumed generally good
- No sacrifice of speed or flexibility

**III DECISIONS**

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions

43 The majority of decisions a manager has to make are of this kind Despite the common saying that someone who makes 51% correct decisions is ahead of the game it is usually tacitly assumed that the vast majority if not all tactical decisions made by good managers are good Even if someone took the time to



research this it would be difficult because it is rarely possible to reconstruct the information available or potentially available to the decisionmaker In a field where it is possible in contract bridge I once made a study of 10 000 decisions from World Championship play and found that about 20% of decisions were demonstrably bad But less than 1/4 of these (4 5% of the total) were penalized by bad outcome An almost equal number of bad outcomes (4%) were the results of decisions that could not be faulted But it should be noted that bad outcomes were actually four times as likely to result from a bad decision than from a cor rect one When the outcomes were quantified the differences were much more apparent All catastrophic outcomes were the results of demonstrably bad deci sions even after deducting those catastrophic results the remaining bad out comes from bad decisions were on average more than twice as costly as bad outcomes from correct decisions Most significantly by any standards of com parison those who had made the fewest bad decisions came out best while those who had made the greatest number of bad decisions came out worst There is incidentally no reason to suppose that all managers in business and government entrusted with making decisions are of world championship standard

**A POLICY DECISION SACRIFICES FLEXIBILITY FOR OTHER AIMS**

Defining and publicizing objectives missions or goals

Pre empting lower levels from making decisions that are too sensitive or difficult to be left to them

Reducing tactical decision time in recurring situations

Establishing a consistent incentive (or disincentive) structure

**III DECISIONS**

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions

44 Policy decisions are very different from tactical decisions and might be said to be evolved specifically for the purpose of limiting the number of situations in which tactical decisions have to be made

**POLICY DECISIONS ARE A FERTILE FIELD FOR ANALYSIS**

Future directed

Not made under day to day pressures thus allowing the necessary time

Important enough thus justifying the necessary effort

**III DECISIONS**

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions

45 Although policy decisions are an ideal field for analysis the fact is that they are very rarely subjected to analysis This is a vicious cycle If they have

not been subjected to analysis top management will have doubts if they could stand up to analysis Under such conditions analysis might be very destructive and top management will rightly avoid retrospective analysis Since even a new policy decision very often involves re analysis of older policies policy analysis is rarely practiced

**PLANNING**

**Four related but distinct activities**

1. **Evaluating and working out a program**
2. **Creating and coordinating a system of programs**
3. **Arraying alternative systems for decision**
4. **Making the decision to adopt one of them**

III DECISIONS

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions

46 Planning is eminently suited for analysis because it is by its very nature future directed

**PLANNING**

**Four related but distinct activities**

1. **Evaluating and working out a program**
2. **Creating and coordinating a system of programs**
3. **Arraying alternative systems for decision**
4. **Making the decision to adopt one of them**

**PLANNING**

Minimum Analytic requirements for each

1 Utility/cost analysis
2 Forecasts and Analysis
3 Financial analysis
4 Analysis

47 Each of these four planning activities requires its own kind of analytic activity which has been given the same number on the slide on the right We will presently see a diagram explaining and illustrating this a little better

III DECISIONS

Tactical Decisions

Policy Decisions

Planning Decisions

Strategic Decisions



48 Strategic decisions are by definition important and by nature longterm Hence they always call for analysis

**DECISION CHARACTERISTICS**

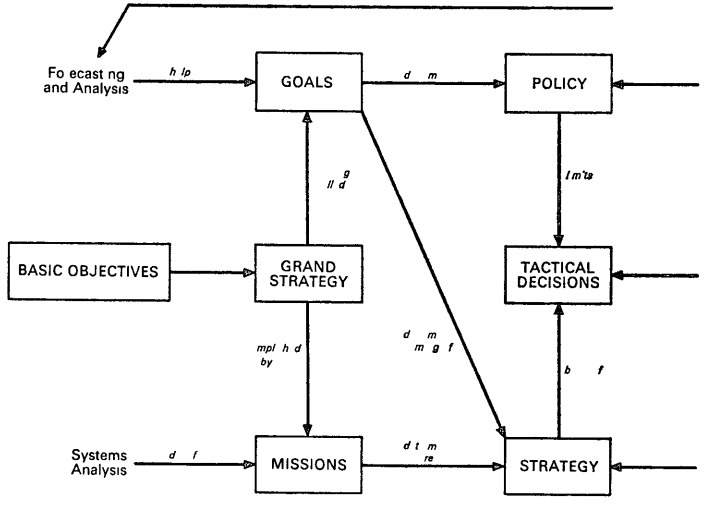
| | TACTICAL DECISIONS | STRATEGIC DECISIONS | POLICY DECISIONS |
|---|---|---|---|
| Respond to | New situations | Permanent basic objectives & goals | Recurring situations |
| Value of precedent | Limited | Very limited | Great |
| Informat on on present & future | Usually scanty | Always essential | Usually available |
| Complexity | Irrelevant | Usually great | Manageable |
| Expected impact | Short or Medium term | Long term | Permanent |
| Implementation | Almost 100/ of decision | Important part of decision | Not pa t of decis on |
| Specific resource allocations | Minor or none | Major part of decision | Not part of decision |
| Time of analysis | Little if any | Much | Very much |

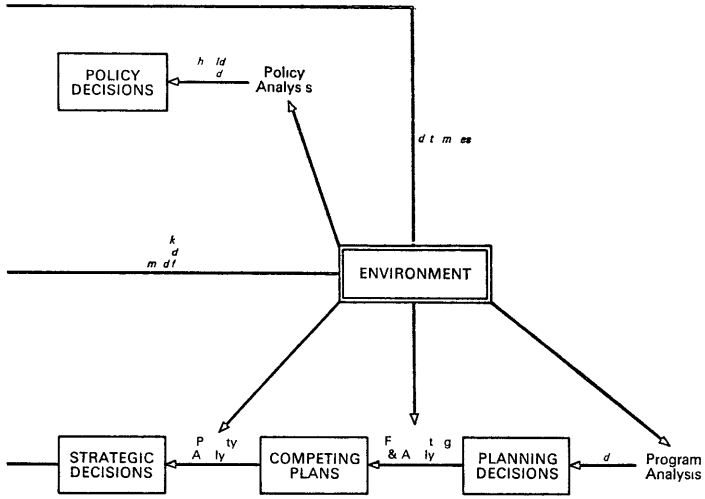
49 This shows the relative needs for analysis of three of the kinds of decisions we have discussed

50 This is another way of showing the need for decisions and analysis at various stages in the decision process

51 We might sum up the essentials of a good strategic decision You can see that practically everything connected with it belongs to the realm of Analysis The analysis is not exactly the same as that which develops and tests forecasts

**DECISION AND ANALYSIS NEEDS**






**GOOD STRATEGIC DECISIONS ARE BASED ON**

- Overall objectives
- Adequate information
- Relevant essentials
- Awareness of their long term implications
- Feasibility and implementation considerations
- Analysis to balance all competing claims

but it is a very similar process requiring all the same skills and a few beyond I would like to call this Strategic Analysis This is most important and I would one day like to make it a subject of another presentation to you

**ANALYSTS OFTEN CAN**

- Show what present or future information is relevant
- Estimate the cost and utility of obtaining information about the present
- Estimate the confidence and utility of developing forecasts
- Identify areas where further information is worth seeking
- Exclude areas where it is not

52 For now let me only deal with the contribution forecasting analysts can make to improved strategic decisions
Lastly if you still have a few more minutes I feel I ought to say a few words



about the technique called Decision Analysis It sounds very much like what I have been discussing but it is actually a technical term for something slightly different

53 This chart summarizes the similarities and the differences between what I have called Analysis and what is usually called decision analysis

Let me give you an example of decision analysis at work one that has been used by decision analysis teams in presentations to management

A decisionmaker is faced with annual losses from one of his factories in Nowhere Kansas He explains that the town of Nowhere depends entirely on this factory for income and would cease to exist if the factory were closed or moved He claims that since one cannot put a value on the life of a town there is no way to quantify this particular factor in his overall decision
Decision analysts quickly prove to him that he is mistaken in this belief They ask him whether he would be willing to keep the factory open if it lost him $100 million a year? Of course not $10 million? He could not afford it $5 million? Not even that $10 000? The decisionmaker explains that a loss of $10 000 a year might be due to the cost accounting procedures used rather than actual deficits It certainly would not lead him to close down any factory $100 000 then? Yes he would take the loss and keep the town in being
Thus the probing goes on until a value is found somewhere between $100 000 and $5 million at which the decisionmaker is roughly indifferent between keeping the factory going and closing it down That is the value he attaches to keeping the town in being

**ANALYSIS AND DECISION ANALYSIS**

| | |
|---|---|
| Applicable to | |
| Essential tools | |
| Helps to identify | |
| Direct contact with decisionmaker | |
| Decisionmaker's subjective attitudes to quantifiables (utility risk preference etc.) | |
| Decisionmaker's subjective valuation of intangibles | |

| DECISION ANALYSIS | ANALYSIS |
|---|---|
| Strategic Decisions | |
| Some Policy Decisions | All Policy Decisions |
| Logic<br>Quantitative Methods<br>Systems Analysis | |
| Statistical Decision Theory<br>Modeling Methodology | Forecast ng<br>Analysis of the Futu e |
| Information utility<br>Decision alternatives<br>Sensitiv ty to crucial variables | |
| Decisionmaker s<br>personal values | Future environment<br>Conseque ces of decision |
| Essential | H ghly des rable |
| Reconciles to po nt of<br>consistency and encodes | Broadens and mod fies b a aying<br>and analyz ng alternatives ir quan<br>t tat ve se ies ( ensit vity a lysis) |
| Quant f es and encodes | B oadens a d mod f es by i t o<br>duc ng t ne d me sio |

So far, so good The decisionmaker sees that he does attach a definite value to keeping the town alive which can be put into the calculations The value is subjective one might even say arbitrary but it is his decision Decision Analysis helps him, among other things to base his decisions on his own values

Could Analysis do as much?

In the same situation the Analyst would proceed quite differently He would examine the production facilities and their capabilities and capacities He would examine the outlook for the products manufactured there at present What market is there for them in the future? Will it increase? Will it decrease? Are modification of the products possible to expand the markets or to forestall their shrinking? What other new products are coming down the company s pipeline? Is the factory suitable for producing any of them? What is their potential?

Even at this early stage in the investigation the future of the factory at No where Kansas will give an added dimension to any decision regarding it That decision will no longer be arbitrary on the contrary anyone who reads the Analysis will come to roughly the same conclusion It may be that the long term outlook is hopeless in which case the sooner the future closing of the factory is announced to allow individuals in the town to begin relocating the better it will be for all concerned Or else it might be that within a few years the production facility will be essential to the company s future and save it a huge new capital expenditure Under such circumstances one might imagine that the company would be willing to keep the factory open even if the loss during each of the next few years were much larger than the figure arrived at by Decision Analysis

No implication is intended that a good decision analyst would not have been



capable of bringing out the need for an Analysis along these lines He well might have and if it were a crucial part of the overall decision he probably would But there is a fundamental difference in attitude if not in method Decision Analysis very much accepts the fact that decisionmakers have subjective criteria values and preferences and it tries to help them to arrive at a decision which reflects these correctly Analysis on the other hand starts from the premise that differences in valuation are due to differences in assumptions expectations or objectives It proceeds by clarifying the objectives examining the assumptions and creating a forecast framework to classify and illuminate the expectations If the Analysis is well done read and believed then the decision will no longer be arbitrary It may still embody differences in objectives but it will be clear to all concerned what these differences are

# THE ANONYMITY OF THE "OMNISCIENT" INSTITUTIONS VERSUS THE ANONYMITY OF THE UNINFORMED MASSES

FRITZ LIENEMANN
*Staff Director Center Berlin for Future Research*

This title is too much subtly formulated but I think that it expresses main causes of the dissatisfying situations in the governments and political decision making processes of many countries Therefore this title gives us the basic points of application for political innovations

In the following statement I want to demonstrate the main problematic (I) then I will show in greater detail some problems of decision making processes (II) and finally I will give some recommendations for improving the decision making processes the governmental organisation and the relations between government and people (III)

Here I can make only a rough draft of the problems and make suggestions of some possible solutions This is too much to treat here in one paper therefore I will try to give special attention to the most interesting questions

## I

By the expression institutions in the title I mean the totality of the political organisation and government (planning departments legislative executive powers and so on)

By the expression masses I mean all the people in their social stratification and groupings

As the ultimate goal of all efforts of political innovation I will set a policy that is rational in terms of its realization and at the same time results in easing of tensions satisfaction and happiness The main problem of this very general formulated goal lies in the discrepancy between the executive power and the men who will feel the political measures

a *rational* policy is a planned policy a homogeneous policy which implies all the conditions of modern decision theory such as the adequacy of goals the consistency of measures the conformity to the system and others

The *happiness of the largest number* finds its expression in displaying an unlimited diversification of wishes and goals and a slightly synchronized coexist

ence of norms and values briefly in the freedom of demonstrating individuality in all its multiplicity (and contradictions)

In this polarity *information* functions as the mediator to keep balance and relax tensions

## A FROM THE POINT OF VIEW OF THE POLICY MAKER

If policy is bound to be oriented on several poles and multidimensional then the policy maker needs information on the multiplicity of goals and on the intensity and degree of social stratification But there are many difficulties in getting this information

1) First of all we have to assume that the politician really wants to make a rational policy for the common weal which means neglecting the interests of his party In reality we hardly find this assumption although it probably isn t utopian a consequent policy to the common weal gives the greatest guarantee for reelection With respect to acquiring information there exists a latent danger of the manipulation of information in favour of the established government or the (invisible) rulers

2) There is an inherent difficulty which lies in the nature of the object itself in order to insure the inclusion of knowledge about wishes and facts in the politi cal decision making process information must be operationalized This requires that the information be made available for use in the necessary form In relation to the great importance of this complex theoretical and empirical social research and statistics are only in the beginning stages

3) A further difficulty is closely connected to the previous point the objects of information in this case the population in its stratification and with its social interactions aren t conscious enough of the immense importance of informing the politicians beyond that the citizen does not have the ability to articulate himself on his own matters nor about his environment

4) The problems the politicians are concerned with become more and more complex and extensive Decisions on the sociological and economic order or on science and technology for instance cause irreversible effects (industrialisation technical revolution and so on) [1]

## B FROM THE POINT OF VIEW OF THE CITIZEN

In order to make all citizens more conscious on their role within the whole system a greater activity of the government is required in informing the citizens on decision points

1) The citizen needs information on the mechanisms of political decision making and on the problems which have to be solved in a much more far reach ing open and dynamic manner than we can find in any state today This is primarily a problem of education The civics program of West European schools is not adequate enough to stimulate the political activity and interest of the normal citizen nor to attain participation in goal seeking and planning

2) The information of the politicians about their problems and modes of procedure must be *popularized* they have to be translated into the colloquial language Otherwise there will continue to be a lack of comprehension—even when the level of education rises This translation has in addition the effect that the politician can not limit his declarations on hot problems by provisos



3) Beyond this the information on political problems must be *individual ized* The citizen will *not* take interest in political problems if it isn t shown to him in what manner he is affected by a problem and by the decisions which the politicians take—or do not take At the same time the citizen must be shown in what manner other sections of the population are affected by that problem so that he is feeling the multiplicity and diversity of the phenomena By demonstrat ing the diverse effects of measures on different groups the egoistical thinking should give ground to a more altruistic thinking in the sense of common good

The mass media above all television have a very important task of political education Television should permanently broadcast popularized and individ ualized information on actual problems and the proposed measures for solution This is not solely a matter for specialist discussions or interviews of experts Open forums have to be organized TV plays should be written in which actors play —improvised— the consequences of alternative decisions [2]
Today there is little or nothing of this approach to be found The willingness to inform and the ability to inform are not very great on either the side of the politician nor on the side of the citizen

Rational policy is often based on partial information from limited areas or which is easy to find—as it is found

To make the point more strongly the consequence of this description is as follows on both sides resistance is to be found That is the anonymity of the title of this paper which is to be interpreted in mutual interrelation

1) From the point of view of the politician the population is a relatively anonymous mass which cannot express itself in the necessary manner for his decisions Here and there he can see protests (from his point of view obviously unjustified protests) but on the whole the reactions to his measures are meagre The ingratitude of the people the politician thinks is always certain because the masses cannot estimate the difficulties he has to fight against The masses don t know about the difficult art of governing The masses are uninformed

Lack of acknowledgment creates frustration

2) From the point of view of the citizen the politicians (including the party in opposition) are seen as a relatively anonymous group which does not consecrate enough to the problems of the man on the street They act up there The individual perceives the effects of political decision (apart from wars) in decrees and laws which he can understand only with the help of translator—the lawyer— which are not designed for his special needs and in which is not written why they were proclaimed His contacts with politics takes place via adminis trating authorities with impersonal but correctly—as prescribed handling—civil servants The whole field of administration and politics is for the individual man represented as an institution whose decisions are incalculable because he cannot look through the motivations and understand the background He suspects an omniscient command center behind the actions of the institutionalized policy The decisions become lonesome resolutions [3] Often the decisions seem to be unjustified but the citizen considers a protest as hopeless because there may be more there than meets the eye

This does not stand in contradiction to the typical trend of our century to personifying politics The imagination of the omniscience of this person will be much stronger by that trend may it be a popular politician or an expert in

planning with admittance to top secrets The feeling grows in the public that the citizen understands less than ever the real background situation of policy [4] At the elections the citizen has no other criterion than a blind confidence in the common sense of the elected representative [5]

Insecurity and the lack of knowledge create stubbornness lethargy and anxiety

## II

When we fill out these theses with greater refinement and concreteness then the following problems seem to me the most outstanding in the political decision making process and the relation between the politician and the citizen in developed countries[6]

It is the main task to make the diversified and complex political decision processes clearer and more differentiated and to put them at the same time in a more comprehensive context On the other hand the decision process should be more opened for control and insight from outside the decision machinery

Above all we can find difficulties on three levels

1 in the object of decision
2 in the structure and organisation of the decision mechanism
3 in the type of the socio political system (the system of government and the social order) in which the decision maker and the decision object are enclosed

Now I want to elaborate some special problems based on the general outline of the chapter I

### A TO THE OBJECT ITSELF

1) The complexity of social systems and correspondingly the complexity of the effective range of measures undertaken to influence some components of the system make it nearly impossible to show the consequences of the measures up to the last stage Forrester points out that for instance many measures of city planning in the long run turn to the contrary of their intended effect [7] A single man cannot survey the variety of interdependencies and feedback loops In a catalogue of characteristics of complex systems we find

a) The behavior of complex systems appears *counter intuitive* to the average person because the mental processes are conditioned almost exclusively to first order loops (goal seeking loops which contain a single important state variable) But in complex systems cause and effect are no longer closely related either in time or in space

b) A remarkable *insensitivity* to changes in many of the system parameters In a set of 200 variables will only about 5 variables exert a strong influence on the system Dependent on the insensitivity is a recalcitrant resistance to policy changes of most of the parameters

*Therefore we have to try to comprehend the complexity of social systems at best by model building in a way in which we can highlight the most sensitive variables and those variables which have the most effect on determining the system performance*



2) Major problems arise when looking at the effects of measures in the long run especially with regard to the consistency of partial solutions Here we can cite the different effectivity time of the measures which states that the beneficent effects of any solution are dependent on varying lengths of time (Ozbekhan)[8]

*Therefore we have to try to integrate all the problems into one comprehensive system within which we can simulate alternative solutions and test their consistence to one another and to the system as a whole*

There is another reason for the significance of the time aspect in many cases the effects of the measures will be for the benefit of the next generations (or the detriment of the next generations)

*Therefore we have to try to find a standard by which to gauge the benefits and burdens for today and tomorrow (This is an important problem of costbenefit analysis)*

3) The dynamics of the events in developed countries are of a very high speed That means that changes in constellations cannot always result in new planning and evaluating processes The initiating of new study groups specialist committees and scientific advisory councils at each moment when one variable changes costs too much (in money and time)

*Therefore we have to try to increase the ability of automatic reaction and adaptation to changes in the constellations of the system*

### B STRUCTURE AND ORGANISATION OF THE DECISION MECHANISM

4) The ministries and departments of the administration have developed into very specialised sections which are very often independent in their planning decisions This makes the communication between the departments more difficult

This means great disadvantages especially for a policy oriented to long term effects like infrastructure policy The interdependencies of the reality will be cut off by the limitations of the competences of the departments The exchange of information and preliminary studies cannot be sufficient enough The effects of the intended decisions on other sectors and departments will not be sufficiently tested Here we have to introduce more *system oriented thinking* Associated with the horizontal and vertical links and division of functions of the administration is an inconsistence between partial objectives and a conflict of partial and global objectives [9]

We have to integrate the partial problems into greater system units and only in those connections we should make decisions This intensifies the *functional way of thinking* the importance the expenditures and the extent of problem solutions depend only on the functions of the special problem within the whole system This is the systems analysis approach (In fiscal policy we can find an encouraging thinking in this way the planning programming budgeting system)

*Therefore we have to try to keep open the department boundaries and to make the official channels of political decision making variable*

5) The division of problem complexes which in reality are interrelated by the autonomy of the departments finds its parallel in the division between executive power and legislative The legislative does not get enough information

on the single planning steps and the background information of the parliament is scarce

*Therefore we have to try to make more general admittance to the information background information material must be opened to all political levels to the legislative in the same way as to the executive power*

6) The scientific solutions of the problems of complex systems have to be transformed in order to become integrated into the political decision making process The volume and the exactitude of the information can be variable dependent on the order in the hierarchy of the decision making process and dependent on the importance and effective range of the decision in question

*Therefore we have to try to transform the results of social research in such a manner that they can be applied by the political praxis without inaugurating a new staff of advisers The information background must be differentiated dependent on the various levels of the decision making process and dependent on the importance of the decision*

This stands in no contradiction to the demand for information generalization (items 4 and 5) at *one* level (ministry department) information have to be generalized and open to all persons interested in it (horizontal generalization of information)

Between the levels it is possible to differentiate information—according to the different requirements of the demander For the minister of trade for instance it is not necessary to know all details and tricks of the tariff regulation in order to make—still good—tariff policy (This we call the vertical differentiation of information)

## C THE SHAPE OF THE SOCIO POLITICAL SYSTEM

7) At any matters of planning the contact to the population is missing The profile of interests of the population on many planning subjects is not known to the government in some cases the authority does not gain information about the notions of the people directly affected It must be mentioned that there may be great differences between the profile of interests of the population and the preferences of the planners in extreme these interests may be diametrically opposed to another [10]

*Therefore we have to try to come to a broad knowledge of interests of the population on all important items of planning This profile of interests must be integrated into the planning processes by means of a feedback mechanism* [11]

8) We can rarely find the possibility to control the reasons which lead to a decision because the judgements values and preference graduations of the decision makers are not published On the other hand we cannot find out the real motivation of the politician from the official declarations (e g state of the nation message) because they flatter with general platitudes

*Therefore we have to try to strive for the situation where the political decision makers are forced to articulate their judgements and valuations in a clear way to be then published as documents*

This seems to be of special importance with regard to the item 7 profile of interests of the population only by the means of a clear documentation of the valuation processes of the decision makers can people identify with (or refuse) the conceptions of the politicians We have to consider that not all problems can be



decided by technocratic methods and with objective criteria In this case the publication of the ideological standpoint of the decision maker is of great importance for the electorate Beyond this the documentation of political valuations prevents freezing and paralysis of political life The irony is that the more planning there is in a society the more there are open group conflicts Planning sets up a specific locus of decision which becomes a visible point at which pressures can be applied [12] The open discussion about value setting unveil the contradictions in the value concepts of a single politician or of whole sections of the population This gives rise to the need for a more deliberate spelling out of our values It raises such questions as how much do or should we value leisure as opposed to productivity—or in economic terms how much potential GNP growth should we forego for the sake of the increased leisure [13]

## III

For these problems derived from the anonymity concept of the first chapter I see primarily three means of solution which ultimately have to be combined with one another

1 Installation of *comprehensive information systems* for the political decision maker
2 The conception of a *simulation model* by which the complex movements of social systems with regard to time and space can be illustrated
3 *Publishing of the valuations and documentation* of the valuing processes e g by the means of benefit analysis (Nutzwertanalyse)

This is not the place to make more explanations about these methods or their theoretical implications and limitations Social research and future research have quite a lot to do here In this chapter I want to depict only some special items in a broader outline

An *information system* has to satisfy two main requisites

1 It has to include information in different qualities different densities and a call of different criteria of selection in order to comply with the needs of the different levels of the decision making process and apparatus
2 It has to be open in order to integrate the different goal conceptions of the population and in order to control the evaluating of alternatives and the norm setting process of the politician by the population

In each information system we can differentiate three sub systems parallel to the three basic questions of decision making

*What do we want?* — *Analysis of the goals*

*What do we have and can we* presumably *expect?* — *Analysis of the situation*

*How can we reach the goals* and by what measures? — *Analysis of the measures*

### SITUATION ANALYSIS

The normal *data banks* belong to this sub system

But for political decision processes we have to extend the contents of the normal data banks in a far reaching way

First of all such a bank should not only provide the possibility of lining up upon questioning single facts and data lists over time (time series) but at each question point the connections and relations to other data collected in the bank should be provided This means that interdependencies should be integrated already in the basic data bank as far as possible (The interdependence analysis is one of the most difficult research items in the social sciences) The data should be ordered according to the connections existing to other data The main advantage to this reference to the interdependence of the data is that it prevents an isolated consideration of the correlated data

The data bank contributes to the horizontal generalization of information *All* decision makers at one level can make use of *the same* information basis and background The communication will become far more afloat and the division of complex problem areas by department boundaries can be avoided

But there are more items to be considered in the situation analysis of a decision process

1 There should be enough possibilities of *combining* the data and of linking data in mathematical functions
2 There should be enough possibilities of combining indicators to *groups or sectors* There must be the possibility to request all data or indicators of one sector so called sector indexes The composition of the sectors must be open to changes There should also be the possibility to form social indexes e g an index for the standard of living But those indexes imply valuation and weighting processes which must be explicitly demonstrated
3 Apart from actual data and historical trend series an information system should imply *prognosticated trend series* achieved by varying methods of prognosis
4 Beyond this the data bank should include an *analysis of resources* In the decision process these actually available and by prognosis presumably expected resources set limitations to the selection of measures and instruments as well as to goal setting By illustrating these limitations of political actions due to the limited resources of an economy there may be the possibility of starting a nationwide discussion of the redistribution of resources (think of the budget spending on defense and on social investment )
5 The data bank should imply *cost benefit ratios* for indicators where this measurement makes sense These ratios are mostly average proportional numbers e g the average costs of building a new hospital bed (inclusive overhead capital) If we compare these cost benefit relations with the resources then we shall get a first indication of the horizon for actions

## ANALYSIS OF GOALS

Here one should seek possibilities for an efficient citizen participation

One approach would be to analyse goal patterns of established and institutionalized groups A controversial method in usage is *content analysis* This method has the advantage for an information system that the results can be computerized

With regard to future research it is more important to burst the chains of time horizon system boundaries and cultural constraints in order to draft completely



*new goal patterns* and system designs Yet all new ideas have only a chance of realization if they are designed in such a manner that they can be integrated in broader systems—this may be the unchanged rest of the old systems orplainly new systems All new ideas social designs and political innovations must be capable of being operationalized and integrated as components of consistent systems Most of the creative social designers run aground because they too think only partially The mental power of the individual is not sufficient for comprehending the needs of complex social systems

Therefore the attempt must be made to operationalize new goal patterns with the help of indicators The new set of indicators derived from the new set of goals now has to be integrated into the whole machinery of our data bank There it has to be tested for its consistency with the other components and variables In this way we can transform the new formulated goals into *instrumental objectives* An advantageous participation of the population in goal seeking and goal setting is only possible when all aspects of the problem in discussion are clarified (by popularization and individualization) and the goals are operationalized (formulating instrumental objectives by leading back to indicators and testing their consistency) If we have achieved such a connection to our comprehensive data bank and simulation model then the various forms of dialogue between political decision makers partially competent experts and the citizen can result in the direction of applicable future designs

In the same way that our information system implies a feedback reaction mechanism on environmental changes it should imply a feedforward linkage where the results of future research and future planning would be processed and tested through the whole system almost automatically Results of future research itself will then become system variables [14] Goal setting includes value setting and determination of criteria How can these valuations be made explicit? In what manner can they made comparable?

One point of application is the so called *benefit analysis* (Nutzwertanalyse)

For example we want to set new goals for the complex on standard of living concerning its components and its level Therefore we have to list all thinkable components of standard of living This can be done in brain storming sessions by random tests and others This requires two decision processes

1) The *weighting process* with the question which indicators should be compiled to a standard of living index in our individual judgement

2) The *evaluation process* This is the most interesting part of the benefit analysis because here the results of future research can be split up in single components and transformed into instrumental objectives In the evaluation process we have to make a judgement on the degree of quality of the quantified expression of the indicator in discussion according to one s individual and subjective idea of the degree of quality of standard of living (e g the indicator motorcars/inhabitants highest degree may be 1 motorcar for 1 inhabitant or in the contrary 1 motorcar for 100 inhabitants) The reference point is the ideal development of standard of living—at first neglecting the possibilities of ever achieving the goal We have to judge all indicators of our shopping list The other way around we can take our ideal future scenario as the scale of reference in order to judge the degree of quality of the present and then we will see how long the way is to the land of milk and honey

What is the advantage of these methods of concretizing absolute terms? The use of value functions enables us to compare our ideal indicators sets of indicators or scenarios while keeping in consideration individual views and opinions Because the mixture of indicators of the social phenomenon of standard of living is different when two persons carry out the valuation process the real and in absolute terms quantified contents of the two opinions are not comparable But the individual diversity should be preserved when social phenomena are in discussion What is comparable here is the assessment of the degree of quality of the present or the expected future

The political decision maker can concretize this procedure by estimating the possibilities of achieving the ideal goals—an assessment which has to be made on the basis of the grey reality the analysis of the situation the resources the costs of all measures and so on But on the other hand we can give our valuation a more realistic character when the scale of reference is not the ideal world but a world that is as we think desirable and to achieve at the same time—say the world of 1980 Here we can combine our idea of a desirable standard of living and the given limitations in changing whole social economic and political systems within ten years without destroying the economic capacities human resources and culture achievements The use of benefit analysis allows various social groups to participate in the processes of weighting and evaluating the degree of quality of the present (or the future) (This does not solve the difficult question of a representative selection of persons speaking in favour of their social group)

As for the standard of living benefit analysis allows international comparisons The imaginations of an ideal standard of living are surely differing between a Japanese and a German The Japanese will choose another combination of indicators as the German But the measurements of the position of the present —the degree of quality—with regard to the Japanese imagination of an ideal standard of living and/or with regard to those German imaginations are comparable because there are no physical dimensions Maybe the Japanese thinks about his index of standard of living that it lies 40% under the ideal top standard and the German thinks his index (with German imagination of his combination) lies 30% under the ideal (German) top standard then one could say that the present German standard of living lies 10% above the present Japanese standard of living The national oddities mentalities and cultural differences will be preserved in this method of international comparison of phenomena which imply value settings (Werturteile)

I think that such benefit analysis methods could be applied to many questions and problems in the process of goal seeking as well as in the decision making process itself By publishing the value settings of each component of complex phenomena the citizen can control the judgement of the politician The *value setting sessions* could be broadcasted by television here we can make use of the dialectic display (Churchman) and extend the method by the possibilities of phone in (by telephone Krauch)

## ANALYSIS OF MEASURES

In this complex we have to find out the best methods and instruments in order to attain certain objectives Here is not the time nor place of enumerating the methods



Of greatest importance for the purpose of public control is the necessity of documenting the value setting process of the decision makers One method here is the principle of benefit analysis too This means that the evaluation process concerns not the degree of quality of indicators in order to express certain indexes but the evaluation of the qualities of alternative instruments in order to reach certain objectives These judgements result in a so called value matrix

## IV SUMMARY

I tried to give some starting points for implementing innovations in decision making processes

*The installation of a comprehensive information system aims at a more rationale and flexible policy*

*The documentation of value settings and selection of criteria aims at a greater possibility for citizen control*

*The search for individual (or group) goals the operationalization and testing for consistency with the whole system performance aims at greater participation in decision making*

The third complex of difficulties in the decision making process the difficulties in the objects of decision (that is the complex socio economic system) I will have to omit In this case the solution lies in establishment and operation of *simulation models* Through simulation we want to demonstrate the consequences of measures and instruments in time and space

It is obvious that the problems in policy making can only be solved to a certain extent by the proposed methods There is still plenty of room for intuition Citizen participation is limited as well especially when too much differentiation and diversity is required which hinders the functioning of the whole system Then we have to ask whether rational policy always means good policy

I am seemingly optimistic about the long range possibilities of implementing these political innovations The greatest political innovation of all and that required with the greatest urgency is the need for a new public policy making culture in which futures are an integral part of the appreciate framework of governmental decisions and activities [15]

My proposals in order to overcome the tendencies toward polarization of the institutionalized policymaking process and the situation of the stubborn and uninformed citizen are

*Generalization of the information base the complexity of social systems must be considered in the whole decision making process on all levels and in all departments The functional role of the part with regard to the performance of the whole system is the only standard of measurement*

*Broadening of the goal seeking process the population in all its sections and stratification must find ways of articulating the goals The transformation of goals into instrumental objectives and testing of consistency and evaluation of the degrees of quality of certain social aspects must be institutionalized*

*Documentation and publication of the value and norm setting process of the politicians*

We can relate those two anonymities to one another i e the politician s

feeble excuse of the uninformed masses and the citizen s feeble excuse of the omniscience of the institutions if we raise the population s level of awareness through better information and opportunities for participation while we lower the politician s self estimation of his possibilities to solve complex problems This can only be accomplished if the politician is educated to the importance of counter intuitive movements in social systems and the significance of public control of the decision making process

## NOTES

1) Andreas Fischer Futurologie Fragen Probleme Resultate der Zukunftsfor schung (*Rissener Studien*) Hamburg 1968 S 49 f

2) Robert Jungk distinguishes three types of information which are absolutely neces sary in a democracy
   a) information about consequences (of new developments)
   b) information about interests (of various groups of the population)
   c) information about connections (of partial development trends)
   Jungk Zukunftsmoglichkeiten der Demokratie In *analysen und prognosen* Heft 6/1969 S 4

3) Nigel Calder Parlament und Wissenschaft In *Unsere Welt* 1985 Munchen/ Basel/Wien 1969 S 336

4) Asa Briggs Regierung und Verwaltung im Jahre 1985 In *Unsere Welt* 1985 Munchen/Basel/Wien 1969 S 319

5) Martin Shubik Information Rationalitat und Entscheidungsfreiheit in einer zukunftigen demokratischen Gesellschaftsordnung In Kommission fur das Jahr 2000 Der Weg ins Jahr 2000 Munchen/Basel/Wien 1968 S 171

6) I relate here to developed and industrialized countries because in developing countries the complexity of the socio economic system mostly is of lesser degree and policy making isn t institutionalized in the above mentioned sense

7) Jay W Forrester Planning Under the Dynamic Influences of Complex Social Systems OECD Working Symposium on Long Range Forecasting and Planning Bel lagio/Italy 1968

8) Hassan Ozbekhan On Some of the Fundamental Problems in Planning Con ference of the Austrian College (25 Internationale Hochschulwochen) Futures Vision Research Planning? Alpbach 1969

9) Hans Peter Widmaier Infrastructure Planning for the Decades Ahead (With Special Reference to Investment in Education and Health) In *analysen und prognosen* Heft 6/1969 S 13

10) Helmut Krauch Forschungsplanung Studiengruppe fur Systemforschung Heidelberg 1969

11) The Institute for Regional Planning of the Technical University of Zurich/ Switzerland (Institut fur Orts Regional und Landesplanung der ETH Zurich) devel opes such an automated feedback mechanism See H O Luthe Die Wirkungsweise gesellschaftlicher Leitbilder in der Orts Regional und Landesplanung Conference of the Austrian UNESCO Commission on Methods of Social Planning Vienna 1969

12) Daniel Bell Notes on the Post Industrial Society (II) In *The Public Interest* 7/1967 p 102–118

13) Irene Taviss The Technological Societies Some Challenges for Social Science

14) Robert Jungk Zukunftsmoglichkeiten der Demokratie l c p 5

15) Yehezkel Dror Futures in Government RAND Corporation P-3909 Santa Monica Calif 1968 p 3

# A FRAMEWORK FOR FUTURISTICS IN HAWAII

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What follows is essentially a very brief introduction to the general theory that underlies the activities which the State of Hawaii is undertaking as The Governor s Commission on Hawaii 2000 Some details on the specific activities of that Commission are found at the end of this paper

## I

The purpose of this portion of the paper is to explain and illustrate the by no means unique contention that the range of appropriate social institutions avail able to a society is determined in part by that society s level of technological development and hence that as a society s technology develops its social institu tions can and usually should be altered accordingly [1]

The position expressed in this paper proceeds from the general assumptions of social systems theory of the Parsons Merton Almond variety without neces sarily adhering to the details of any particular formulation of it Among the basic notions of concern here is the assumption that societies exist to perform certain functions which are necessary for (or at least almost invariably as sociated with) human group life However different societies have for one reason or another adopted a large variety of different institutions (structures) to perform these social functions For example all socialize children into the mores of the group Thus socialization seems to be a basic societal function How ever societies differ markedly not only in the substance of what is being com municated (a problem I am not going to be concerned with at this time) but also they differ in the kinds of socializing institutions themselves—which is what interests me here

Continuing to follow the notions of structural/functionalism we see that not all structures adequately perform the functions they seem to have been intended to perform That is they appear to be dysfunctional structures Similarly some structures may either absolutely or in relation to other aspects in a society, perform the functions better than other structures do

Thus the assumptions of structural/functionalism suggest that in relation to the functions they are intended to perform social structures can be placed along a continuum running from eufunctional to dysfunctional Some of the structures thus arrayed are extremely appropriate for the functions they are intended to perform while others are quite inappropriate Among those that are appropriate (functional) some may be significantly more satisfactory than others Yet at the same time structures which are quite different in composition may be equally satisfactory in performance and thus may be placed at the same point on the eufunctional dysfunctional continuum

At several places later on in this paper I shall be stating that at each general level of technological development a society has a range of appropriate institutions available to it When I make this statement I have in mind this notion of institutions placed along the eufunctional dysfunctional continuum and I am freely admitting that for each level of technology there may be a considerable number of appropriate institutions which can perform the necessary or desired functions for that society Thus I am by no means suggesting that for each level of technology there is only one appropriate institutional response There may be several which though structurally different are functionally equivalent At the same time the theory here suggests that some institutions are more appropriate than others and that some are positively inappropriate This notion gives us some criteria however vague by which to evaluate social and here political structures

## II

It is not my intention to trace the development of contemporary socio political institutions in the West from their beginning to the present But it seems advisable to suggest what I might find were I to engage in such a survey

Table I is an outline of the sorts of interrelationships between level of technology size of population and types of several social institutions we might expect to see from such an historical/anthropological survey Please note that Table I is a model and not an historical typology further while I believe it to have general historical validity there may be many specific communities which differ from the model Finally I am not suggesting that the variables included in the model are the only important ones For example it very well may turn out to be the case that the characteristics of genetic pools are of more importance in determining community adaptive responses than are any of the variables I included in the model I would appreciate comments on this point as well as on any others raised in the paper

Social values and institutions are human adaptive responses to natural and (subsequently) man altered environments Broadly speaking 1) increasing control over human food supplies (including farming fishing hunting and animal husbandry) 2) the development of tools (*i e* non organic implements which are extensions of human physiology and/or senses) and more recently 3) improving control over the health and length (and soon form) of life by essentially medical advances have been the dominant features of these adaptive responses Baldly stated then human history to this point in terms of social development has been in part the elaboration of Marshall McLuhan s dictum we shape our tools and thereafter our tools shape us the introduction of a new level of technology into a society profoundly disrupts indeed tends to destroy that society s values and institutions Whereas early human adaptive responses were mainly intended to help the group cope with the natural environment at first gradually and now almost exclusively social values and institutions are being forced to alter simply in order to become appropriate for a rapidly changing technology Many contemporary social ills are to some extent if not mainly the consequences of the inability of values and institutions residual from earlier eras to cope with the problem of changing modern technology and especially of rapid change itself [2]



Table I Some Societal Characteristics at Five Stages of Development and Three Futures is divided into five historical stages and three alternative futures Within each stage are seven characteristics which are listed in the same order in each stage Thus #1 refers to the level of agricultural development #2 refers to animal husbandry while #3 is the level of technology generally These three characteristics are postulated as being among the independent variables which cause the changes in the latter four characteristics However #4 the size and composition of the population while itself dependent upon the first three characteristics then becomes an intervening variable of considerable significance in determining the features of the remaining three characteristics These three characteristics I must point out are merely illustrative of all social institutions rather than exhaustive or especially important I picked them simply because they especially interest me but there are many social institutions which are excluded in the Table the family the economy the educational or socializing system religion and the like In any event #5 states the specificity or diffuseness of roles and institutions #6 designates the ethical system (*i e* the system of rules for relating men to men and men to nature) and #7 regards the socio political decision making system

**TABLE I**
**SOME SOCIETAL CHARACTERISTICS AT FIVE STAGES OF DEVELOPMENT, AND THREE FUTURES**

I
FIRST MAN

1 Berry and fruit gathering
2 Animals caught by hand or already dead
3 Few tools
4 Face to face personal encounters all people known personally
5 No specialization of roles or institutions save by age or sex
6 Ethics specific rules for relating to all people and situations
7 Social (political) decisions reached by trial and error or by force

II
PRE CIVILIZATION

1 Simple cultivation (*eg* planting of natural seeds)
2 Trapping and weapon assisted hunting some domestication of animals

3 Stone and wood tools fire boats sleds the wheel speech
4 Mostly face to face population
5 Mostly diffuse institutions some role specialization by occupation
6 Specific rules for known people general rules for unknown people
7 Social decisions by precedence (importance of oldest and wisest with greatest suc cessful experience) trial and error or force for new situations

III
CIVILIZATION

1 More developed agriculture
2 Many domesticated animals herding common
3 Iron bronze and other metal tools writing
4 Increasing population first cities most people outsiders and seldom met
5 Development of first non working class specialists—priests warriors rulers
6 Social decisions by precedence (priests and rulers) who apply principles derived from precedence to new situations Codification and sanctification of earlier ethico political rules

IV
FEUDAL PRE INDUSTRIAL

1 Established agriculture (plow seed selection irrigation crop rotation fertilizers)
2 Animal breeding
3 More advanced tools cottage industry the printing press
4 Extensive population though number of people actually met small for most indi viduals large urban centers imperialism and/or feudalism population growing though imperceptibly
5 Increasing role and institutional specialization
6 Absolute generalized rules for all roles and situations
7 Gradual movement from law applying to law making in social decisions (*ie* applying reason rather than precedent to solve new problems by end of period

V
INDUSTRIAL

1 Use of increasingly advanced tools in agriculture sharply declining % of population in agriculture use of genetically modified seeds and synthetic fertilizers
2 Extinction of many natural species artificially bred animals
3 Science the Industrial Revolution mass production discovery of new lands and tools Fossil fuels and minerals electricity electronics
4 Extensive and rapidly increasing population over population medicines reduce deaths
5 Age of mass society almost totally specialized roles and institutions
6 Absolute rules for all roles and situations but increased population and mobility make it difficult thus attempt to leave it to conscience as general vague guilt inducing basis of ethics
7 Height of analytic legislation (i e law making on rational basis) or from past experience by economic political pressure or fatigue Objective (meaning non personal ) administration and courts

## THREE FUTURES

VI A
THE UNPLANNED FUTURE OF THE PRESENT

1 Depletion and exhaustion of food and fossil fuel and mineral supplies



2 Eventual death of plants and animals by environmental pollution
3 Extinction of this world by pollution overpopulation famine and war
4 Ever rapidly increasing population till doomsday
5 Continued isolation fragmentation overspecialization of roles and institutions
6 Increasingly punitive attempts to apply old moralities to new situations but too many new situations and old moralities are inadequate
7 End of legitimacy civil and world wars isolated police states fight till end

VI B
RETURN TO THE GARDEN OF EDEN

(The attempt to return to states I II or III by ecologists hippies counter culture advocates is thwarted by the depletion of foods and fuels and the polluting and crowd ing pressures resulting in State VI A)

VI C
A POSSIBLE CYBERNATED INDIVIDUALIZED FUTURE

1 Synthetic foods fuels materials
2 Machine augmented beings genetically engineered beings cyborgs
3 Post industrial automated cybernated virtually totally man made environment gradual elimination of natural world both in man and environment except as preserves reservations or fail safe measures
4 Toward a stabilized socially determined artificially reproduced population
5 At first birth of the polytechnic man then totally diffuse institutions and roles as the social necessity of human activity decreases
6 Progressively fewer general rules greater tolerance of differences all decisions situational to persons not roles minimal dependency of one person on any other (emotional as well as economic or physical)
7 Participatory decisions use of systems analysis and cybernated problem solving replacement of bureaucracy and courts by computers (*ie* greater personalized application of more personally tailored legislation) increasingly international scope of some decisions more localization and personalization of most

The basic points contained in Table I are these earliest man (Stage I) at the point of separation from his pre human ancestors made (except perhaps for speech) no unnatural [3] adaptive responses to his environment he lived by gathering berries and fruit by eating the flesh of animals he caught by hand or encountered as previously killed animals He had very few and very simple tools to serve as mediators between himself and his environment and almost none which could be considered primarily to be extensions of his senses The world s total population was quite small and for the typical individual human the encountered population was smaller still—just those few score to several thou sand persons who constituted his tribe and the few other tribes that he met around him In short each individual personally knew all the people in the world Within his tribe there were few specialized roles or institutions—most people did all things except for some distinctions made imperative by age or sex

In this situation a code of ethics was not necessary (and probably not possible) Instead each individual determined or was assigned an appropriate mode of behavior in relation to each other individual Morals that is were specific for each individual and not either specific for structures or general for

roles Social or political decisions (that is decisions for the group as a whole) were determined either by force or by trial and error

In the second stage of social development before civilization man developed some simple techniques of cultivation he also learned how to trap animals and hunt them with weapons and he domesticated some animals Man also devel oped some other tools which helped him adjust to and master his environment (and in the process of interaction with his tools to develop physiologically as a human)—stone bone and wooden tools fire boats sleds and the wheel The population of the world was growing but still remained face to face for most persons Functionally specialized roles were developing too though they were relatively rare Because population remained small specific rules continued for persons frequently encountered and general rules were developed for persons seldom met As a result of accumulated trials and successes (and remembered trials and errors) social decisions were typically by precedent after consultation with the oldest (and hence because most experienced the wisest) persons in the community Unprecedented situations continued to be met by trial and error as before

The third stage of social development that of civilization is marked by even more human control over nature in the form of improved agriculture and animal husbandry the use of metal tools the invention of writing and by increasing population Indeed it is this combination of factors that makes civilization (that is life in cities) possible increased agricultural production through technology resulted in surplus population which could live parasiti cally in cities without working It further made both possible and necessary the development of more specialized roles—priests farmers warriors rulers artisans etc —and the need for more generalized (less personally specific) code of ethics This was achieved by codifying and sanctifying the older experientally determined public and private decision making rules [4]

By the fourth stage of social development—the feudal (in its beginning) and the pre industrial (as its conclusion) we find well established agriculture and animal breeding and an increasing development of tools and simple machines Population at the beginning of this period was relatively static or (in the Western case) fluctuating around a slowly rising mean which was influenced by famines plagues gluts and improving technology and knowledge [5]

World population by this time was considerable and there were flourishing cities and (a carryover from the late civilization stage) empires The average individual however still encountered only a small number of people with whom he knew exactly how to relate—absolute generalized rules provided guidance for all roles and situations and some roles and institutions themselves were rather rigidly specialized though many remained diffuse

Group decisions at the beginning of this period were characterized by apply ing precedent to known problems By the end of the period increased population and developing technology presented so many new problems that precedent alone did not suffice What was needed was law making not simply law applying Thus parliaments developed

And finally we reach contemporary society Synthetic seeds and artificial fertilizers are widely used the percent of the population engaged in agriculture continues to decline many natural animal species have been rendered extinct



by human action while other animals are almost entirely bred and maintained by man some unable even to reproduce themselves without human assistance

The period is titled by its dominant characteristic—industry—which implies that while the struggle for human mastery over the environment previously was centered on increasing human control over agriculture by the fifth stage man is able to turn his attention to extending his body and senses in non agricultural areas—to technological development Technological development in this period is based largely on the rapid exploitation of fossil fuels and natural mined materials organized through a system of mass production This feature of mass production indeed for the first time is extended to almost all institutions and perhaps is the only adequate response possible given the type of technology available to the demographic imperatives of this period—namely the necessity of dealing with the unprecedented population increase an increase from 800 million in 1800 to 3 5 billion by 1970 This population growth though now the major independent variable in society is itself in large measure the con sequence not only of improvements in agricultural and industrial techniques but also of modern medicine which greatly increased the life span without sufficiently lowering the birth rate even for those countries which do not share in the improved agricultural and industrial technologies themselves Hence almost all social institutions have to produce on a mass basis just to keep up with the population—the economic system of course but also the educational system the ethical system the political system and the rest There simply are too many people around to treat them all individually given the level of tech nology available Instead categories of people were made and people were produced who would fit into the categories While institutions and values other than those of mass society are imaginable as responses to large popula tion rapid population growth and industrial technology none other has ever been adopted by real societies as far as I know

Stage five brings us to the present or perhaps to the recent past if we are as it seems to me in a transition period What of the future? There are a large number of futures of varying probability of occurrence [6] Here I will cite only three major types of possible futures all of roughly equal probability of occur rence in my opinion

The first is the unplanned unguided future of the present—the future of our exponential lines of growth Of this future there is no further significant future because it apparently leads to the destruction of life Our inability or refusal to act quickly and appropriately to solve our socio ecological problems may lead to our extinction population will continue to grow food and fuels will become exhausted plants and animals will die of pollution countries will be torn by massive internal and external violence as reactionary forces refuse to change in response to new demands and awarenesses

A second possible future now increasingly popular especially among many young people unfortunately has the same conclusion in my opinion but will be reached as a result of our attempt to recapture some earlier period of devel opment such as a pre industrial or even pre civilized society I anticipate that such an attempt now championed by some ecologists and by some mentors of the counter culture [7] is doomed to failure because I doubt that men will give up the ameliorative consequences of technology if the harmful consequences

can be controlled and because in any event I do not believe that we have the time to return to an earlier state—our problems will overwhelm us if we seek to cope only by return

Thus I suggest the desirability of a third future one quite different from the present and vastly different from the past But it is the only type of future which accepts the fact that man may have unalterably destroyed his natural environ ment and thus must work with nature to create a new one that man is creating machines which may be more intelligent as well as stronger than he is that man can alter his own form and nature Thus not only is man s physical environ ment mallable but so is man himself and the main task of preparation for the future is that of exploring the implications and planning for the consequences of those powers before they happen [8]

## III

Several people who have heard about the activities connected with the Gover nor s Commission on Hawaii 2000 have suggested that I describe some of the activities in the belief that our endeavor may offer an example of one way in which the general population can be brought realistically into futures research and planning activities I offer this very brief and incomplete statement as a partial example of a way in which futurists can avoid on the one hand the frequently valid criticism of elitism and on the other hand help assure that a futuristic orientation will be diffused rapidly throughout the structures and values of a society so that necessary radical change can be introduced swiftly into a society

Several advanced warnings are in order however

1) The events described below are in mid process [9] While virtually no significant organized resistance has been made to the activities of the Com mission or its members yet the process is not completed structural changes have certainly not yet been made and values have not yet been radically altered I am convinced that major broadly accepted changes will occur in fact along the lines outlined below But I may be wrong In spite (or because) of our procedures overwhelming resistance may in fact be met and the whole enterprise be defeated But so far we feel we have been and will be generally successful in introducting significant and widespread change

2) I am not claiming our activities in Hawaii are unique In fact one of the purposes of this report is to elicit responses from others who are similarly active or who have information about other attempts at popular participation in futuristic activities

3) In making this report I am neither implying that our method is the best one for Hawaii nor am I suggesting that what seems at least satisfactory for Hawaii is necessarily workable anywhere else in the world Our opportu nity and our situation may be unique On this point too I request discussion

The original idea that the State of Hawaii take a serious look at its future seems to have originated in the mind of Mr George Chaplin editor of the Hono lulu *Advertiser* partly as a result of having read some of the articles and books written by many persons at this conference



In the spring of 1969 the Hawaii State Legislature appropriated a sum of money for the appointment of a Commission on Hawaii 2000 and in the Fall of 1969 about 25 members broadly representative of the population of Hawaii in ethnic occupational economic sex age and educational distribution were appointed by Governor John Burns

This commission was empowered to do three things

1) Hold a Conference on the theme Hawaii 2000 which was held in August 1970

2) Evaluate the Conference

3) Make recommendations to the Governor and Legislature for further action

I do not want to spend time here detailing the content of our discussions I believe that what may be of interest to persons here is the method of planning we have used I will discuss this under four broad areas

1) We have tried to get the members of the Commission to think imagina tively about the future Like the intelligent and socially concerned people that they are their original view of the future was generally that of seeking solutions to the pressing problems of the present We used a number of decises to get them to lift their eyes from the present and to gaze at and otherwise become prepared for designing the future In this enterprise we placed into the hands of all of these members copies of the books and articles written by some members of this Conference and have through formal and informal talks with them attempted to get a broadly futuristic orientation into their thinking I would say that this attempt has been hugely successful and that the Com mission fully supports the attempt to extend this awareness of the future to the general population

2) From the very first day of our meetings as a Commission as our minutes will attest we have been concerned that ours not be an elitist activity In order to get the awareness and support of as many of the citizens of Hawaii as possible we have undertaken a great many activities some of which I will list and only inadequately explain

A) We had a series of Interim Lectures wherein well known state specialists in one of ten areas made major public addresses (widely covered in the press and on television) on the problems of Hawaii in each area in the future On the program with each lecturer were several discussants at least one of whom was a student and one a person generally taking a position somewhat at odds with that of the main speaker

B) Of very great importance for the operation of the August Conference was the existence of ten Study Groups composed of a chairman and from twenty to thirty people appointed from lists of interested citizens collected from all sources possible The composition of these Study Groups was extremely diverse There were representatives from the Legislature and Administration from the business community students (university and high school) university experts and simply concerned citizens who volunteered to join An attempt was also made to see that women were not underrepresented and that the various ethnic groups in Hawaii were fairly represented as well

The task of these Study Groups was to come up with a position paper on the alternative futures for Hawaii in their area of concern (example Study Groups

are The Arts Hawaii s People and Life Styles Privacy and the Individual Political Decision Making and the Law and others) In order to help assure that the Study Groups took as futuristic an orientation as possible a well known futurist was hired as a consultant to the Group and both submitted a general statement of what pitfalls the Group might avoid in thinking about the future of their areas and what new things they might anticipate and also wrote a criticism of the position paper which the Study Group submitted to the Conference (Communication between the Study Group and the futurist was by mail)

C) A futuristic orientation is being written into several academic curricula Already there exist a series of seminars on the theme Hawaii 2000 at the University of Hawaii and I teach both a graduate and an undergraduate course on futuristics in the Department of Political Science In addition a high school public affairs group called Pacific and Asian Affairs Council has taken the theme Hawaii 2000 Make it Your World for its activities in 1970 and has made some extremely serious and interesting preparations for this Under the direction of the Center for Governmental Development of the Division of Continuing Education and Community Service at the University of Hawaii several workshops on futuristics for members of the State Department of Education and for public and private school administrators and teachers are being offered so that a futuristic orientation can be immediately written into the curriculum of the State educational system Other University professors have also incorporated a futuristic perspective into their teaching and research and a cross disciplinary Futures Studies Program is under development

D) One of the brightest aspects of the whole affair in Hawaii has been the tremendous support of the government Professor Glenn Paige and myself made speeches before the Tenth Annual Meeting of State and Local Officials in Hilo Hawaii in December 1969 And on January 26 1970 we were both very privileged to address a Joint Session of the Hawaii State Legislature at the very beginning of their 1970 Session so that the Legislature as a whole could hear discussion on the necessity and opportunity of futuristic activity These speeches were extremely well received and given very broad coverage in the press and on television so much so that the members of the Commission have continuously been called upon to appear throughout the State to discuss futuristics

Not the least of the activities relative to the political process was a six week workshop for high level state (and some Federal) administrators which introduced them also to a futuristic orientation as it might apply to their particular governmental responsibilities

E) It has been my especial contention that the presentation of futuristic notions to the public must be made as entertainingly not to say futuristically as possible Of great help in this area was the cooperation of the Junior Advertising Club of Honolulu (composed of junior members of the advertising agencies in the State) who took the Governor s Commission as their public service activity for 1970 They prepared a series of television and radio messages a brochure describing the Commission which was available to any citizen who phoned or wrote for it as well as the production of a bumper



sticker and placards—in short a complete advertising campaign forcefully yet tastefully launched

3) As is plain from the above we were concerned that youth with a wide variety of views participate fully and honestly in the planning for and execution of the Conference But we did not feel that was enough and quite independently of our direction a group of students representative of most political and social groups in Hawaii met in July 1970 to take what they billed as An Aquarian Perspective on Hawaii 2000

4) We were also concerned that this not be an urban (namely Honolulu) dominated undertaking We had representatives from the Neighbor Islands on the State Commission itself But in addition each of the other three major islands chose its own Commission to take a look at its own future They held separate conferences and issued reports which will also be integrated into the final report of the State Commission

5) We had an international and especially Pacific area interest from the beginning of our proceedings One of the Study groups was named Hawaii and the Pacific Community I should also like to point out that structurally separate from the Governor s Conference but functionally related was a conference conducted by the East/West Center of the University of Hawaii on The Future of Asia The hope was both to introduce more Asians to the study of the future and to introduce Asia to more futurists

The above describes a movement in an ongoing process—a single frame in a cinema of change It is a story that must be written in the future tense If Hawaii has been the first political community to look at its future (and it may not be) it cannot be the last The existence of a future and the qualitative improvement of future life, depends upon all societies making the same attempt but doing it better

## REFERENCE

1 Emmanuel Mesthene *Technological Change Its Impact on Man and Society* (Harvard University Press 1970) contains a balanced statement of this position

2 On this see especially Alvin Toffler *Future Shock* (Random House 1970)

3 As will become clear I do not believe that it is possible for man to perform an unnatural act Everything man does—or can do—is natural I use the term in quotes in the body of this text merely to refer to acts which are minimally assisted by technology—and to which we are accustomed

4 I suggest that the commonality found in most ancient social codes—the Ten Commandments the Codes of Hammurabi etc —serves not to prove that they are eternally valid truths but rather derives from the fact that these pre and early civilized men were faced with similar problems of adapting to a generally similar environment Hence the types of functional human adaptations specified here in absolute laws could be expected to be broadly the same Among the implications of this observation for the present and for future societies is that rules and institutions found functional in one environment might be dysfunctional in another changed environment

5 Although I do not develop the point in what follows knowledge organizing technologies—written language libraries the printing press and scientific method and theories—are especially important in this period of social development

6 From the point of view of the present it seems to me most helpful if we consider that there is no single future—though there will be only one when we get there — but a variety of alternative futures of greater or lesser probability of occurrence and which require more or less conscious human intervention for their attainment or preservation Though only examples of a small number of other possible futures the suprise free futures and canonical variations found in Herman Kahn and Anthony Wiener *The Year 2000* (Macmillan 1967) make this point clear

7 I am dismayed at the timid and past oriented visions of the future put forward as solutions to our various ecological and socio political problems by many ecologists and humanists For a statement by what seems to me to be a frightened and backward looking but currently very popular writer see Theodore Roszak *The Making of the Counter Culture* (Doubleday 1969)

8 Gordon Rattray Taylor *The Biological Time Bomb* (World 1968) Albert Rosen feld *Second Genesis* (Prentice Hall 1969) and works by such scientists as The odosius Dobzhansky Joshua Lederberg Hermann Muller and others make it clear that man is gaining control over his own biological and mental make up as well as over his external physical environment We may be approaching a situation where there are no fixed parameters only a multiplicity of variables Thus there is no greater urgency than for man to anticipate and design a continually evolving future in which he can accept and work towards modification of his own and Mother Nature

9 The Proceedings of the Conference in August and of the final Study Group Re ports are edited by George Chaplin and myself and are available to interested persons who may address me at the Department of Political Science University of Hawaii Honolulu Hawaii 96822

10 The Hawaii State Legislature set up a nine man Commission on Hawaii 2000 to spearhead continuation of the work of the original Commission

# ON SOME THEORETICAL AND IDEOLOGICAL PROBLEMS OF SOCIAL FORECASTING, PROGNOSTICATION AND PLANNING

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The problems concerning the general and specific features of the future society with its special phenomena and procedures are of a great scientific ideological and practical importance Some of these problems will be discussed in this paper as well as the problem of social forecasting prognostication and planning as the relations of these activities with sociology and their ideological importance These problems will be consecutively considered in this paper with out pretending to be comprehensive or infallible

The only preliminary note that I would like to make concerns some difficul ties in terminology The ethimological meaning of the words Forecasting and Prognostication is one and the same But very often in science a word acquires a meaning different from that in the ordinary language Proceeding from the very content of the theoretical activity for study of the future and from the history of that kind of activity I make a definite distinction between Fore casting and Prognostication It may sound very strange to those colleagues who speak the Roman languages But in that case important is the base for that distinction as well as the considerations by force of which these two kinds theo retical activities are differentiated

In the case of the two Slavonic languages in which I write the Bulgarian and the Russian the above mentioned distinction does not raise any terminological difficulties In the English language too an attempt was made for differentiating the two kinds of theoretical activities for study of the future I mean Prof Karl Popper In his books The Poverty of Historicism and The Open Society and its Enemies the author declares himself in defence of short term prognos tication as being based on scientific methods and rejects long term prognos tication or large scale prognostication as not being based on scientific methods Although his critics against the objective laws of functioning and development of human society and against scientific forecasting of the basic social processes is not well grounded the very distinction between short term prognostication and large scale prognostication gave me an impulse for the positive solution of this problem

## SCIENTIFIC FORECASTING AND PROGNOSTICATION

Unlike many authors I see no reasons for establishing identity between these two notions though they are rather closely connected

In a most general sense forecasting and prognostication are different forms and stages of knowledge about the future state and behaviour of a certain system this knowledge being indirectly deduced on the basis of our knowledge about the past and present state and behaviour of the same system In gnoseolog ical point of view both are more or less precise or approximately ideal forms of such a state in the future of a certain system which will not correspond exactly to reality being only a potential probability and a natural consequence of the laws governing the development and functioning of the system under certain conditions

The similarity of the most general gnoseological logical and pragmatic character of forecasting and prognostication does not exclude the problem of their differentiation What is the specific character of both activities?

1 Having as a criterion the levels of knowledge i e from the point of view of the stage of penetration into the internal physiology of society and describing the society s parameters we could define *forecasting* as a more general and ab stract form of knowledge and impact on society while *prognostication* is the more concrete and empiric form

*Forecasting* with respect to society is such a form of knowledge by which on the basis of the already known laws and general conditions about the functioning and development of society at present and in the past we could logically deduce the main trends of the future development Unlike the so called dynamic laws governing the domains of the natural sciences (e g the solar system) and deter mining exactly the behaviour of certain phenomena thus conditioning precise forecasting of the future development of each element of the system (e g the solar and lunar eclipses) the social laws have a predominantly statistical character and determine the general trends of change of a system Therefore forecasting refers mainly to the *basic course* of development to the *principal trends main functional and structural changes of the system* and does not apply to the concrete forms and ways of realization of the main trends

*Prognostication* is such a form of knowledge by which much more concrete parameters of the future state and development of a certain system are investi gated and determined on the basis of a scientific forecasting of the main trends of development Prognostication is also a form of forecasting forecasting at a level where the main trends are expressed more concretely and empirically While forecasting has for its starting base mainly the established laws for the functioning and development of social system which are in force under definite conditions prognostication has not only this basis but also the immediate empitic existence of these laws Forecasting is a logical inference from the laws about the functioning and development of a social system under definite condi tions deduced on the basis of the past and present empiric material Prognostica tion is not confined to determining the main trends but is also a cognitive activity aimed at establishing all the possible logical consequences of the main



parameters of the concrete empiric existence of a social system based on definite laws

Thus forecasting and prognostication have similar logical structures but have also considerable differences Forecasting is a logical deduction the result of definite social laws and initial and secondary conditions under which the certain laws hold good

The premises of the deduction of prognoses include definite social laws and initial and secondary conditions under which these laws are valid We should note however that by forecasting inferences are deduced mainly on the basis of laws while the initial and secondary conditions act as bail for the validity of these laws By prognostication inferences are made mainly on the basis of an analysis of the initial and secondary conditions framing the definite laws Thus for example Marx has drawn the conclusion that the periodic economical production crises are inherent for capitalist society and are due to private prop erty free market extension of production and the relative lowering of the purchasing power of the labour class As shown by historical experience on the basis of all these conditions one could draw the conclusion that with capitalist form of economy the periodical productions crises are unavoidable Having this relation in mind the prognosticator will be interested mainly in the specific conditions the possible occurrence of the future crises their size and character

2 As regards the temporal depth and limit of penetration in the future development and behaviour of a social system scientific forecasting or prediction of the main trends *usually does not determine concrete periods of time* though such periods could be generally outlined On the other hand *prognostication is done usually for a definite period* being a calculation of the parameters of the system for a future period which is as a rule shorter than the period outlined by forecasting

3 Forecasting is usually one way activity while prognostication is multi variational This means that by forecasting we try to outline only the general future changes of the structure and functioning of a system which logi cally follow the laws governing this system and do not concern in fact being unable to concern with the immediate forms ways and stages of their realization The presence of many variables in a social system the lack of similarity in their past present and future behaviour present a possibility for making multi variational prognoses

Prognostication is in itself decision making for an optimum variant for reach ing a definite future state of a system No real prognosis chooses only one more or less precisely chosen variant for a future development Social development is by no means determined by the objective laws acting at each of its stages but is determined only as regards its general contents Social development is realized by people s activities by their courses of development aiming at near or distant objectives—social or personal History would have been too much mystical if at each of its stages of development there have been no general or specific variants of realization of its basic laws *The purpose of prognostication is to find the best variant for the future social development which could correspond to the objective needs and possibilities and which could serve as a basis for planning of immediate practical actions*

4 Certain differentiation between forecasting and prognostication could be

made as well on the basis of a criterion such as the objective of people s practical activities Scientific forecasting formulates perspectives of the future changes in society which could be taken as *value orientation mile stones* for the activities of peoples i e they become not only an inevitable objective but an objective consciously strived for In general scientific forecasting is a basis for formulating the objectives of conscious activity

On the other hand the objective could be a basis for prognostication for investigating the means ways and terms for reaching a definite goal A great objective though scientificall based could entail some illusory infatuations utopic dreams about the periods necessary for the achievement of a certain objective Therefore analyses in prognostication should eliminate utopic ideas and investigate the ways to the scientifically predicted objective

5 Forecasting appraised as a *method of knowledge* as shown in point of the preceding article uses logical and theoretical methods that could be characterized as *methods of logico theoretical abstraction* To these we could refer not only the classical methods of induction and deduction of synthesis and analysis but also methods of transition from theoretical concreteness to theoretical abstraction and vice versa the method of systematic analysis etc

Prognostication not ignoring these methods is not restricted to them only but uses some additional methods by which specifically describes the behaviour of a social system among these additional methods the quantitative one plays an important even decisive part

Among methods used here we could mention expert assessment analogy and extrapolation All these are rather convenient but unfortunately are not entirely reliable from scientific and practical point of view as they do not take into account any probable future *qualitative changes in the structure of a system*

Being somewhat inadequate these methods could be replaced by more complex and precise methods such as complex extrapolation modeling and experimental methods Especially important are the systematic functional and structural approach By these methods a system is considered as a hierarchy of sub systems and sub sub systems having complex functional and genetic relations Changes in each one of these sub systems influence as a rule the whole system Tracing the future development of a social system is an exceptionally hard task that could be divided into several main stages analysis of the development of each sub system in its relative independence analysis of the interaction of two or more sub system analysis of the social system as a whole Methods of absfraction of hypotheses of social experiments modeling etc are applied for solving of these problems

In general we could say that forecasting is based on *logico theoretical deduction* While prognostication implies some other methods as well which could be called methods of computation The method of materialistic dialectics is the general methodological basis of these two forms of knowledge (or of these two levels of forecasting)

Here is an example although insufficient which illustrates the definitions which we have made Marxists take as a matter of fact event that the substantial differences between town and village life between manual labour and intellectual work will wiped out in the future development of science technology and public relations This generally covers the main scientific forecasting As a more



concrete form of forecasting prognostication has for its objective the calculation (based on respective analyses of all factors) of the future development of a definite problem in ten or twenty years and has to choose the best possible way of realization of this problem i e —to determine the strategy during this period of solving a distant problem

## PROGNOSTICATION AND PLANNING

The preceding article has already thrown light on the relation between these two notions In order to explain more precisely this problem we should stick to some general requirements of the systematic approach Society as a system is characterised by an extremely complex structure It presents an integral unity of a variety of storey like or even more precisely pyramid like situated systems and sub systems characterizing the structure the origin and regionality of the whole system

Such a character but already in a gnoseological aspect have also social sciences Each of them treats its subject as a system from the point of view of different aspects—starting from the most general to the more specific and concrete one

Such a character has also the practical activity of the leading social institutions expressed in collecting a stock of social information in decision making in issuing decrees and regulations and in performing their functions of control By all these activities the social institutions treat society as a complex system and differentiate between the general and the particular essential and insignificant basic and inessential decisive and unimportant substantial and immediate empiric remote and forthcoming

From the point of view of this cursorily mentioned systematic approach forecasting prognostication and planning are different levels different units and different stages of the unique process of social knowledge and social activity All these categories are future projections of the present knowledge and activity But while *forecasting* means fixing the basic regular tendencies for a not absolutely and exactly determined future *prognostication* means choosing the optimal variant for a given period of time on the basis of much more concrete and much fuller knowledge in quantitative and empirical sense and *planning* is—so to say—the immediate life the immediate realization of the chosen prognostication variant The planning is this part of the whole process which stays most closely to and is a most immediate expression of the empirical reality and the real practical activity of the people That is why under the conditions of the planned social construction the plan assumes the form of a *state law* strictly fixing all the activities for a given period of time The prognostication is a scientific choice/by cognition/ of the rightest way to reach the scientifically forecast aim while the planning is a regulation of the activities of the working people for a movement along this way It is quite another problem that in practice the planning might not be quite precise that it might be based on more or less indicators that it is being carried out through a system of highest to lowest social units—in any case it is a law for the sphere under consideration In this sense the planning is such a form and such a level of social knowledge which most immediately determines the people s activ

ity and which defines the current practical managerial and executive work

Said in other words the planning realizes itself on the basis of the forecasting and prognostication They both are a base for the planning But it does not follow that the planning involves them as its elements—they are as we saw previously relatively independent / though interrelated / qualitatively different levels of the social knowledge and activity

Prognostication is possible also in the frame of the plan s period as well as on the basis of the plan For instance on the basis of the degree and the character of the fulfillment of the plan for the first year one might give prognoses for the fulfillment of the whole five year plan In such a case it seems as if the planning is a base for the prognostication Such examples point out the close link and the mutual interrelation between the prognostication and the planning which does not in any case remove the problem of their qualitative specificity

## SOCIOLOGY AND SOCIAL PROGNOSTICATION AND PLANNING

The whole combination of scientific and practical activities related to the forecasting prognostication and planning have as their basis a complicated system of theories and methods In the foundation of this system lies a proper philosophical method Then come the sociology the political economy and the other social sciences known so far At the end comes a specific sub system of theories and methods called Futurology

*First* Sociology plays a decisive role in the social prognostication and planning first of all by its theoretical system of concepts categories and laws reflecting more or less the complex social system As science of sociological laws regulating the functioning and the development of the society of the structure and the interrelation of the basic components of the social system of its basic stages of development and its regional modifications the sociology is the only science that traces the fundamental and the regular tendencies of the future changes and states of the social system as a whole

This does not mean that the other social sciences do not have any importance As sciences treating different main fields of the social life they give such data for forecasting prognostication and planning as the sociology alone can never give But the society can be developed systematically and harmoniously if the scientific guidance incorporates not only the different processes but also the society as a whole The planned guidance of the socialist society and especially the prognostication have a complex sociological character—not only an economic one / although a relatively independent economic planning can also exist /

Said in other words the social prognostication and planning are not a mechanical sum of respective activity for the different components of the social structure but an activity aimed at comprising the basic dependencies between these components and their future dynamics That is why the prognostication and the planning are tasks not only for economists or technical engineers but for social engineers / sociologists too

The social prognostication and planning of the whole social development has ever a systematic sociological character from a two fold point of view Firstly from the point of view of the mutual dependence and proportions in functioning



and development of the basic components of the social system / economics social relations science education etc / and secondly from the point of view of the organizational forms / social groups and organizations / which are bearers of the social activities and relations / productive enterprises and concerns scientific and educational institutes ministries etc /

*Second* Sociology plays a big role in the social prognostication and planning also with its concrete empirical contents The prognostic activity presupposes availlability of vast information on the social processes While the separate social sciences supply information on the separate social phenomena only the sociology is able to furnish the necessary information on the social system as a whole Even if the gathered information is related at first sight to a separate social phenomenon / for instance the religious feelings of the population / this information—since it is sociological one—involves the relationship of this phenomenon with the all other most important phenomena

*Third* At last sociology is necessary for prognostication and planning with its arsenal of theoretical and empirical methods with the help of which the information is being gathered systematized and theoretically processed

## FORECASTING, PROGNOSTICATION, PLANNING AND SOME IDEOLOGICAL PROBLEMS

The problems of forecasting prognostication and planning are exceptionally important and at least in three basical aspects scientific practical and ideological

Which are the most important ideological aspects of the scientific and the practical activity aimed at forecasting prognostication and planning the social changes and development?

*The first problem* is that of the place of the prognostic activity in the process of scientific forecasting As a rule many scientists—non marxists (Karl Popper for example) reject the possibilility of scientific forecasting in the marxist sense i e as an unavoidable consequence of determined objective laws of social development Prognostication is being considered as the only possible form of scientific penetration into the future behaviour of the social system based upon its present empirical situation The same scientists think that the problem of forecasting was being treated by the ideologists while the real scientists were engaged in making prognoses i e in applying of scientific mainly mathematical methods

This represents a part of the big controversy of the character of the social knowledge of the role of empirical and theoretical methods of the possibility for deducing in a scientific way laws of the social development etc In this respect we could only point out that all the practical successes of forecasting prognostication and planning prove the practical effectiveness of their common philosophical and methodological prerequisites

On the other hand it is being considered that the problem of forecasting / often identified with prognostication / has been formed as a scientific problem only in the last decades—mainly in connection with the scientific technical revolution and the development of some new methods of knowledge It is quite clear that this is true for the prognostication As far as the scientific forecasting is concerned it has a longer history Excluding the false forecasting connected

with the naive religious ideas about the after life the end of the world the doomsday etc as well as the great social utopia of Thomas Moore Campanella Saint Simon we could mention a long line of forecasting in Marxism based on the exact scientific research of the real social relations These forecastings were the basis on which developed some of the mass movements for deep social changes in the last century

The last decades mark a new stage in the development of the scientific fore casting—it is being enriched by the prognostication system of methods tracing the most probable and most profitable/the shortest and the cheapest/ways from the present to the future general forecasting for the society s development Prog nostication is being developed as a new form of scientific penetration into the future in which the more common scientific forecastings are being linked with the present through a system of bridges The most suitable of these bridges represent a basis for the planning and the immediate activities of the whole society

The social scientific and gnoseological reasons which caused a new stage in the scientific forecasting or—more exactly—a coming into being of a new form of scientific penetration into the future—at least in the socialist society—are as follows

1 Accumulation of vast experience in the field of scientific forecasting the basic tendencies of the socialist development and planning the social economic activities On the basis of this experience one can draw the conclusion that the long run planning is an important tool for making most exact plans and for an accelerated development of the society The idea of the long run planning is the original formulation of the contempo rary prognostication with the exception of the specific for this activity methodological instrumentarium
2 Development in increasing scale of scientific technical revolution which leads to deep changes in all units of the socialist society and accelerates the development of the productive forces and the social relations
3 Stormy development of science emerging of new scientific disciplines and renovation of the traditional ones forming of systems of scientific meth ods—philosophical logical sociological mathematical cybernetical etc which in combination with using of electron computers give possibility for gathering and rapid processing of vast quantities of scientific informa tion
4 Development of social social political and democratic relations in the socialist society which gives the possibility for increasing the role of the science and the scientific groups in solving the basic problems of the social guidance This fact creates conditions under which the objective polivariability of the social prognoses can be interpreted not as a retreat but as a form of the exactest approach to the scientifically forecast aims
5 Competition with the capitalist system or more exactly the necessity of a scientific explanation of the political and the ideological aspects of the scientific technical economic and political development of the present world

These basic reasons in their unity led in the last decades to the emerging and forming of the prognostication as a new form of scientific penetration into the future of the socialist society



As regards the capitalist countries the reasons for the prognostic boom might be enumerated approximately in the following way

1 Vast concentration and centralization of capital labour and management
2 Increasing the state s role in the guidance of economic with some slight efforts for planning—not without the influence of the socialist countries experience
3 Stormy development of the scientific technical revolution leading to fundamental social changes in capitalist society including straining the social cataclysms
4 Development of science and increasing the role of the Technocracy in the guidance of economics and the social relations
5 Severing the battle between the systems of socialism and capitalism for gaining the masses consciousness about the perspectives and the develop ment of mankind in the future and about the ways for settling the deep social contradictions of the capitalist system

*The second ideological problem* related to the prognostication originates not from the general gnoseological and methodological aspect of this kind of scien tific and practical activity but from its *object*—the perspectives of mankind s future The ideas for the future notwithstanding their mystic semi scientific or scientific character have ever had and have an ideological lining Because they express certain ideology because they are closely related to certain social inter ests because they influence in one or other way the practical activities of the people s masses and of the leading organizations Nowadays the final decision of the controversy between the socialism and the capitalism depends on the question which ideology will be able to gain the masses on its side and which ideology will be able to organize better their activities in favour of society s development And this depends to a certain extent on a) the scientifically grounded perspec tives of the nations b) the ability to design scientifically the rightest ways for reaching these perspectives c) the ability of the masses to be organized and led on the traced ways towards the forecast aims

A substantial problem for the prognostication is not only its immediate ideological instrumentarium but also the aims at which it is directed This is much more important nowadays when the social and the scientifict echnical development have reached such a degree that the prognosed and the planned actions of the governments might have vast consequences for the whole man kind s future Will the prognoses serve the cause of war or peace of freedom or tyranny and exploitation of democracy or totalitarism of cooperation and mutual help of the nations or of their enmity unequality of rights and robbery of fast development of the underdeveloped countries or their still greater rela tive impoverishment—all these are problems which no scientist prognosist could get rid of however far from the ideology he might be in the first sight

Said in other words forecasting prognostication programming and planning are powerful instruments of influence on the social changes and development Consequently they are an element of the ideological relations of the world of today That is why the development of the theory of such kind of activity / some

call it prognostics and others futurology / elaborating its methods and applying it successfully in the practice are important scientific problems directly related to the ideological controversies in the world of today

# CITIZEN SAMPLING SIMULATIONS A METHOD FOR INVOLVING THE PUBLIC IN SOCIAL PLANNING

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## ABSTRACT

The growth of the planning function of government raises the question of how plann ing can be accomplished by democratic means A new technological device—the teaching computer—seems to be ideally suited for discussions between experts and the public on issues of medium and long range planning The teaching computer can be thought of as a mass communications system with feedback

## POSSIBLY A NEW FUNCTION OF GOVERNMENT

In the past two to five years there has been a marked increase in long range planning activity in the United States and many other nations Several develop ments—the establishment of new institutes the founding of new journals and the sharp increase in the number of books concerned with the future—attest to the emergence of a new field of activity in many institutions and particularly in industry government and universities

Most leaders have had a group of advisers sometimes given a special name like Brain Trust which served as auxiliary eyes ears brains feet or whatever to the chief executive However the advisory function seems to be presently

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undergoing a transformation Not only are increased efforts being made to discern possible future dangers and opportunities there is also growing interest in social indicators which would supplement existing economic indicators Olson[1] had explained that social indicators would give us measures for the quality of life in addition to measures of quantity of output such as the gross national product and total steel production Better information about where we are now and how well our present programs are working would presumably help us in deciding where we want to go and what actions are required to get us there

**Policy Principles Needed to Coordinate Programs**

The demand for changes in existing administrative procedures is in part the result of a need to coordinate the large number of federal programs now on the books Between 1960 and 1968 the number of federal domestic programs in the United States increased from 45 to 435 according to Daniel P Moynihan[2] the President s adviser on urban affairs One attempt to bring coordination to these programs was reported in *The New York Times* on October 29 1969 by Robert B Semple Jr [3]

> Mr Nixon has been urged not only to give Mr Moynihan wider jurisdiction but to give his current apparatus a deeper staff and a broad mandate to design an overall urban strategy and to measure all new program proposals that flow from Government agencies against this strategy There is no group in the White House—and there never has been—that performs this function on a continuing basis

Many people are becoming concerned that our efforts to build a better society do not seem to be producing desirable results For example Richard Goodwin[4] has said

> Take New York City or any big city If you ask who decided that this is the way people are supposed to live the answer is Nobody If you took the 200 most powerful people in New York or Boston and put them in a room and tried to find out if any of them had decided that this is the way people ought to live you d find that none of them had—or at least weren t aware they had So where are the villains? The villain is the set of values and the structure

Moynihan[2] has written The federal establishment must develop a much heightened sensitivity to its hidden urban policies He contends that few officials habitually display such sensitivity

> They are to their minds simply building highways guaranteeing mortgages advancing agriculture or whatever No one has made clear to them that they are simultaneously redistributing employment opportunities segregating or desegregating neighborhoods depopulating the countryside and filling up slums etc all these things as second and third order consequences of nomi nally unrelated programs

The effort to deal with interrelated problems is increasing the planning activity in the United States If indeed a new function of government is emerging the long term survival of a national commitment to planning will require public support for this activity Probably the least coercive way of achieving long term public support for decision making procedures is to involve the public in the decision making process



The preceding discussion raises at least two very important questions

1 Does the growth in the planning activity of government require new forms of communication between the public and government planning personnel if a democratic form of government is to be maintained?
2 Through what communications media and institutional structures can the members of a community or a nation discuss and decide how they want to live assuming that it is not possible to get everyone together in a single room at the same time?

**How Things Are Done Now**

A review of the existing methodologies for public discussion would seem to be instructive

1 The essay methodology is used by professors and government officials for communicating with each other The essays may be published in journals or government reports but they rarely reach a large part of the population
2 The committee as a means of communication involves much redundancy and frequently more emotion than information Certainly emotion is an important indicator of intensity of feeling The point is that the committee however useful for purposes such as face to face confrontation is not well suited to exchanging the greatest amount of somewhat abstract information in the shortest amount of time for each person involved
3 Mass rallies are important for offering the opportunity to express or renew an emotional commitment Very little information is exchanged The rally is better suited to solidify attitudes than to change them
4 Radio talk shows seem to be most useful immediately after a domestic disturbance such as a city wide strike In times of relative domestic tran quility they tend to be banal and irrelevant to the concerns of the majority of listeners
5 Town meetings with questions from the floor have frequently been praised as the ideal form of government though an impractical one in a mass society Town meetings have other disadvantages however They are frequently boring and time consuming and are subject to disruption The level of discussion tends to be geared low and visual aids are rarely used
6 Administrative action tempered by lobbyists permits some but not very extensive public participation Those who are concerned would probably like to be more involved if a means for greater participation existed
7 In regard to mass media news reports television and radio are evanescent The viewer or listener has no opportunity to go back and examine the logi cal argument or to check a point he missed while his mind was diverted by an earlier remark Newspapers particularly in the United States concen trate on day to day events rather than on analysis and criticism of perfor mance over time
8 Congress is well suited to legislating programs but it does not at present systematically review the success or failure of the programs which it enacts Also Congress in its current form is not organized to coordinate federal programs The vast majority of Congressional activity takes place in committees which have specialized interests
9 Films and phonograph records are usually thought of as cultural or enter

tainment media But their use as vehicles for political messages has been growing not incidentally because they are the media most accessible to young people

Moynihan[2] has noted that efforts to involve citizens in the planning process at the local level have not had the measure of success which was hoped for One reason might be that there has been no way both to inform and to poll the public at a reasonable cost in terms of the time required from administrative personnel

Additional criteria for a good communications system for discussing ideas are that it should be free of boredom transmit information with little distortion provide the opportunity to ask questions and require that background informa tion is understood before an opinion is given

## A NEW MEDIUM FOR COMMUNICATION

I have now asserted that the policy making processes of major institutions are entering a period of major change and that the governmental institutions are changing in a way which raises issues regarding desirable forms of government I will now try to show how a new medium for mass communications offers the possibility of increasing the level of citizen information and participation in the formulation of long range public policy

### The Metamorphosis of the "Teaching Computer"

This new medium for communication has existed in rudimentary form for about ten years However the realization of the full range of its implications as a possible tool of the democratic process has been limited by its semantic coding We have been calling it a teaching computer Computer based education equipment has been compared to the printing press in terms of its importance for education However the teaching computer might also be usefully compared to radio and television Radio and television are technologies for communicating transient verbal and visual information from a central source out to a large population A teaching computer not only sends information from the center to the periphery it also brings information back from the individual user to the central source Thus the teaching computer is a communications system with feedback Graphic and pictorial information (and in the near future prestored audio messages) are presented to the individual user at a rate which he controls with his keyset

In addition to its use in conventional educational situations the teaching computer could be used by planning personnel to present policy alternatives as they see them to the public Background information would be available upon the request of the person using the computer based exploration of alternative futures The probable consequences of each alternative could also be a part of the programmed material During the course of the exploration each individual would indicate his opinion of the desirability of each alternative or could be asked to rank them in order of preference As he explored the alternatives background information and probable consequences the explorer would be able to use a comment mode to suggest (a) additional alternatives (b) inade



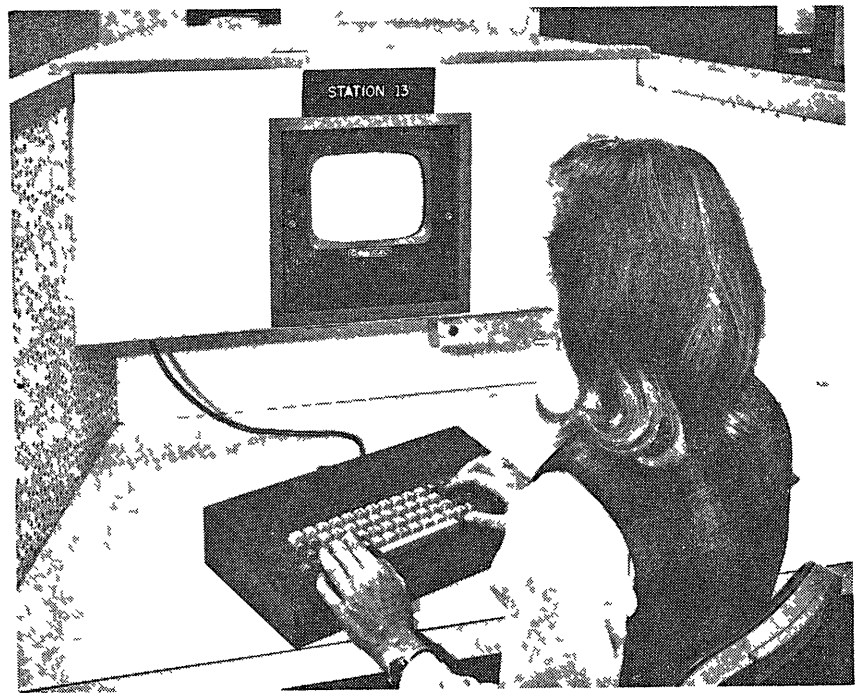
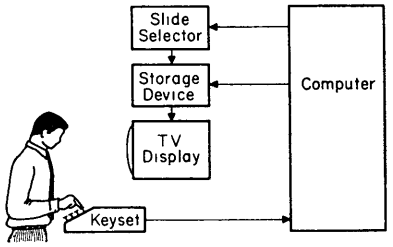



**Figure 1** The PLATO (Programmed Logic for Automatic Teaching Operations) system involves communication in two directions Each student is provided with an electronic keyset as a means of communicating with the computer and a television display for viewing information selected or generated by the computer Many lessons have been written for PLATO including French Russian Latin geometry genetics chemistry and maternity nursing

quacies in the background information provided or (c) his own judgments about the probable consequences of an alternative action

### Preliminary Work is Now Underway

An elementary version of a computer based exploration of alternative fu tures is already in operation using the PLATO system at the Computer based Education Research Laboratory on the University of Illinois campus The details have been explained by Umpleby[5] This exploration was originally proposed by Professor Charles E Osgood[6] as a device for education and social science research It is now regarded as the forerunner of citizen sampling simulations which would use the physical equipment of the teaching computer to exchange information and opinions between experts and a cross section of the public The medium and long range consequences of alternative courses of




Equipment Diagram for PLATO III

**Figure 2** At present a student terminal consists of a television screen and a typewriter keyboard A device for prestored audio messages under computer control will be available in the near future For special purposes motion picture films could be used in conjunction with the new terminal now being developed

**Figure 3** The present PLATO III system consists of a Control Data Corporation 1604 computer and 70 graphic pictorial terminals 20 of which can operate at one time Each student can work at his terminal at his own pace thereby receiving individual attention Computer response time for student requests averages 1/10 second



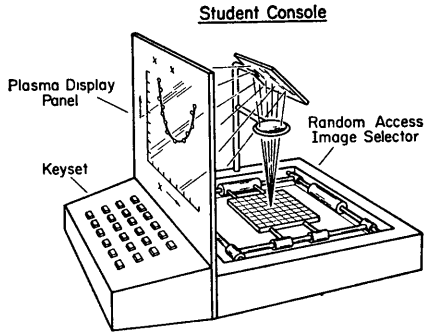



**Figure 4** The PLATO IV system which is scheduled for completion in 1974 will have 4000 terminals all of which can be operated simultaneously from a central computer system Approximately two thousand of these terminals will be located in the University of Illinois and the Champaign Urbana community The remaining terminals will be within a 150 mile radius Using terminals such as that pictured above the PLATO IV system will provide a high quality color display at low cost The terminals will be connected to the computer over standard voice grade telephone lines

action would be simulated and responses obtained from a sample of the population The results which would indicate what the public considers to be desirable or undesirable policies would then be submitted to planning personnel for their consideration The first experiment using a local environmental issue is now being conducted by Valarie Lamont[7]

The distribution of computer based education equipment to grade schools high schools and colleges will probably become widespread during the next two decades The existence of this equipment will bring about the possibility of conducting citizen sampling simulations on the same equipment Facilities which are used by children during the day for education could be used by the parents in the evenings both to learn about existing social conditions and future possibilities and to indicate to planning groups their views on goals and priorities Computer based citizen participation in planning will therefore be possible even before home computer terminals become widely available

However there is no reason why these simulations should follow computer based education Public participation in the formation of local or national policy could in a few years come to be considered very desirable It is also possible that resistance to computer based education will delay its widespread implementation If these situations were to develop the necessary physical equipment could be constructed for purposes of public discussion of policy alternatives Regardless of which comes first on a large scale or which is considered most important a discussion of the economic viability of either computer based education or citizen sampling simulations is incomplete unless all possible uses of the equipment are considered

## A Comparison with Other Proposals

Is the idea of citizen sampling simulations really something new? In order to

answer this question it is useful to list the basic elements involved in the idea

A The physical equipment which is used is the *teaching computer* This device can be thought of as a new medium of mass communication It is a communications system with feedback

B This new communications medium could be used to permit *citizen involvement* in the formulation of public policy

C *The formulation of long range goals and explicit policy principles* to guide the evaluation and coordination of programs might be considered a new function of government

Citizen sampling simulations are thus defined as the use of teaching computers for involving the public not in day to day decision making but in the formulation of policy principles How does this idea differ from other social innovations now being developed? The work with which I am familiar can be listed as follows

1 The Institute for Policy Studies[8] in Washington D C is using simulations of social situations to involve particular groups of the population in thinking about planning Teaching computers are not used (B and C not A) (The letters A B and C refer to the three main elements of the idea of citizen sampling simulations which were outlined above )

2 Most people who are developing the idea of computer based education are primarily concerned with teaching material very similar to what is now taught in classrooms A few simulations are being done but as far as I know no one has suggested using teaching computers to involve large portions of the public in discussions of public policy for purposes of government rather than education (A and B not C)

3 The suggestion has been made many times in recent years that computers offer the opportunity for people to vote on specific issues rather than simply on candidates and an occasional bond issue This is essentially a proposal for transforming representative democracy into direct democracy (B and A perhaps but not C)

4 Political games and simulations such as Harold Guetzkow s Inter Nation Simulation[9] and Ithiel de Sola Pool s simulation of public attitudes during the 1960 presidential election[10] are becoming increasingly popular However neither of these simulations used a teaching computer and neither was intended to involve a representative sample of the population in the discussion of present policy alternatives (not really A B or C)

5 The activity which most closely approaches the idea of citizen sampling simulations is the television program *The Advocates* on educational television The program obtains feedback from its viewers through the telephone system and the mail (B and perhaps C but not A)

A combination of media such as television telephones and the mail is more awkward for the user than a single medium such as the teaching computer The high cost in terms of a person s time and energy is reflected in the less than 100 percent responses by people using the combination of media The teaching computer can record and sort all responses from all its users

There are two principal advantages to having computer based citizen sampling simulations in addition to debates or testimony on television First the point was made earlier that television is by nature evanescent A more general statement is that each communications system lends itself to the transmission of a particular type of information With a teaching computer the student or citizen controls the rate at which information is presented to him He need never be either bored or lost If he is familiar with the information being presented he can jump ahead If he does not understand a particular point he can ask for additional information Thus the teaching computer is very well suited for presenting logically complex material to people at different stages of familiarity with the issues



Second a citizen sampling simulation requires a model of the social processes involved in the situation being discussed in order to be able to predict the consequences of alternative actions The need for an operating model requires experts to state explicitly their notions about how the world works The ideas held by different people about the probable consequences of actions can then be compared

## NECESSARY CONSIDERATIONS DURING PRELIMINARY TESTING

Regardless of the need for more deliberate long range policy making a careful look at the feasibility of citizen sampling simulations is required In addition research projects with probable large scale social consequences must include some consideration of regulation in the public interest

### Economic, Social, and Political Feasibility

1 Some idea of the economic feasibility of citizen sampling simulations can be obtained from estimates by Bitzer and Skaperdas[11] of the cost of a large scale computer based education system Bitzer estimates that the cost of instruction on PLATO IV will be less than fifty cents per hour per student This figure should apply to either educational or governmental use

2 The social feasibility of the idea could be tested in a small city such as Champaign Urbana or perhaps an even smaller community such as the University of Illinois Questions that would have to be answered include the following Will people turn out to play the game ? How much difficulty will they have understanding and dealing with the rather complex issues? How quickly will they be able to adapt to using the teaching computer? What problems are encountered in trying to obtain a representative sample of the population?

Do planners find the data collected to be useful? Are the problems chosen for presentation redefined as the result of feedback from the public?

Are the attitudes of the public on matters of policy changed as the result of exploring alternatives? Do participants change their opinions about the community local government planning and the judgment of their fellow citizens? Do people feel that the decisions which are made after the data from the exploration has been considered are more in keeping with their own desires?

Do people get information through citizen sampling simulations which they would not see otherwise? How much information do people generally look at before making a decision? Is the information presented in more understandable or more useful form than through existing media of communication? Is informa

tion presented in a more interesting and enjoyable form than is possible at present? Do other forms of political participation increase as a result of citizen sampling simulations?

3 Citizen sampling simulations will also have to be accepted by present day decision makers Their response will be influenced by how they believe it will affect the conduct of their jobs how they believe the public will react to it and whether they think it would be in the public interest

There is reason to doubt that some existing institutions are really interested in eliciting public desires Some political leaders are more concerned with conducting public relations with the masses However there are two reasons why political leaders may not actively oppose this new medium First introduction of the equipment will take place over a period of several years Second the idea of a communications system which permits the easy flow of information and opinions in both directions has an appearance of lack of bias which makes it difficult to argue against in abstract form Nevertheless arguments about control of the medium and the wording of specific programs could become agitated

Public acceptance of this new social technology may depend initially on whether it is regarded as a new step toward the computerization of our lives or as a way of using technology to control technology Preliminary research and testing could be conducted like any other research project and distribution of equipment to communities could be gradual However it is also possible that the United States could adopt cheap education for everyone or citizen participation in policy formation as a national goal comparable to landing a man on the moon or building a supersonic transport Such a national commitment could be stimulated by the occurrence of one or more of at least three developments

a International competition for example from Japan could drive the United States to attempt to establish preeminence in a new technology which could have an impact on foreign exchange and the balance of payments For instance the balance of payments consideration was a major factor in the debate over whether to proceed with the development of the supersonic transport

b If a negative public reaction develops to the formulation of policy by experts and bureaucrats or by the most important people of a city citizen sampling simulations could become a response to this criticism

c Further increases in the complexity and urgency of domestic problems could convince the government that improved communication within society is needed John Platt[12] has vividly described the crisis of multiple crises which mankind is now encountering

**Questions of Regulation and Control**

If the idea of citizen sampling simulations seems workable after preliminary testing some thought should be given to the following questions before widespread implementation goes very far

1 Should the physical equipment for these simulations be publicly or privately owned or some combination of the two?

2 Should the institutions which write the programs and collect the responses be governmental agencies universities private corporations or some new kind of institution?



3 How should this new communications system be regulated—by the Federal Communications Commission by a new regulatory agency by Congress or by direct public criticism and the normal legal process as newspapers now are?

4 The approval of only two more state legislatures is required before a second national constitutional convention is called If a constitutional convention is called should citizen sampling simulations be made a part of a new kind of governmental process and thereby become a means not only for discussing goals but also for authoritatively setting goals? The use of computer based education equipment as a technology for the formal governmental process is not likely to happen until the public is very familiar with the equipment and what can be done with it and is convinced of its usefulness

## POSSIBLE LONG-RANGE SOCIAL CONSEQUENCES

The remainder of my remarks will focus on a few of the consequences which might result if citizen sampling simulations become widespread in the next twenty to fifty years All the consequences taken together would constitute a social transformation of major proportions However considering the many communications media now available society is not likely to rearrange itself around a single newcomer at least not overnight Therefore the following possible consequences should be regarded as indications of the direction in which society may be changed rather than as descriptions of a social system not too far off

**The "National Classroom"**

**A Conception of Government**

The fact that both education and government would be using the same physical equipment suggests that these two social activities would be brought closer together Universities might devote less time to teaching professional skills and more time to developing the skills of defining alternatives and recognizing relevant supporting information In addition universities might become more concerned with providing general as opposed to specialized instruction about the physical and social environment thus enabling citizens to more accurately estimate the probable consequences of alternative courses of action If universities were to change in this way they would certainly become more relevant to social problems

Charles Frankel has suggested that democratic government and education have a lot in common He believes that democracy is the best form of government because it is the most educational In this case best can be interpreted to mean the most stable and just in the long run The primary difficulty with the philosopher king approach to government is what happens when the philosopher king dies before a new philosopher king comes along? It is useful to recall that information is stored in only one way—in individual human brains in the form of specific skills or social norms Libraries and data banks contain only symbols which must be interpreted by people A society run by a brilliant and benevolent elite can be irrevocably set back if the elite is displaced from power without a similarly skilled decision making group taking over Another

important consideration in maintaining a viable society is that people are more likely to behave in a cooperative manner if they feel that they have been consulted in determining social policies

During a lifetime an individual's experiences increase his store of knowledge The same process occurs in a society The fact that nations learn by their successes and failures is indicated by slogans such as Another 1929 Another Munich and No more Viet Nam's Of course the lessons of history are subject to varying interpretation Nevertheless it would seem that a society should be able to learn from its experiences and to improve its decision making procedures just as the procedures used by individuals have been improved by techniques such as linear programming game theory simulation and systems analysis One way of improving the learning and decision making processes of a society would seem to be to acquaint more people more thoroughly with the alternatives which decision makers are considering and why they choose the alternatives they do In order to accomplish this it might be helpful to begin thinking of government as an educational activity on a national scale

Television has already created the national classroom The teaching computer offers the possibility of government seminars for those who are interested The United States of America could be thought of as a course in cooperative living with the government the media and the universities operating as a sort of aggregate professor to the rest of the population Of course the students frequently talk back to the instructor but then seminars (democracies) tend to be more interesting than lectures (dictatorships) And of course every four years the students have the opportunity to become the professors which may be a suggestion for the university

**Coercion vs Persuasion**

Every organization uses some combination of coercion and persuasion to enforce group norms The United States is now employing coercion on a very broad range of problems Overt force is being used in Southeast Asia far more than diplomacy coercion is being used to enforce integration in the South and even the universities feel driven to resort to force in order to continue functioning All this is occurring in one of the world's most literate nations a nation having the most advanced communications technologies Perhaps it would be useful to think of persuasion as an alternative to coercion Technology continues to lower the cost of producing social change by means of persuasion rather than coercion Yet there has still not been a widespread recognition of the fact that our strategies for bringing about social change could be substantially altered by making use of communications equipment now available and additional equipment which will become available in the next few decades

**Electronic Town Meetings**

The impact which computer based explorations of alternative policies will have on the distribution of public concern with federal state and local governments will be partly determined by the scale of the networks built A national computer based communications system would most likely consist of a network linking teaching computers in local communities Each local computer would



have its numerous remote terminals Local computer terminal systems will be available in some communities before a national network of teaching computers is operating Consequently it seems probable that this new communications medium will have a noticeable effect on local government before it begins to affect national government By providing a means for citizens to become involved in urban planning and policy formation at the local level these simulations might well increase interest and involvement in local government

**The Federation of Feudal Disciplines**

Dealing with complex real world problems will require using the knowledge of many disciplines and coordinating specialized knowledge not only for presentation to the public but also in building the models used in the programs Thus there would be a tendency toward the amalgamation of social theory and indeed toward the building of a model and presumably in time a theory describing the relationships between all parts of the physical biological and social environment The present trend toward interdisciplinary research would certainly be accelerated The expanded use of computer simulations would increase interest within the social sciences for building mathematical models

**Collective Bargaining and "Industrial Democracy"**

If industrial corporations were to use employee sampling simulations the union management dichotomy could become less pronounced Collective bargaining might have to be rethought Workers and managers could explore the consequences of higher wages and prices such as higher consumer prices and lower real income They could consider together issues such as whether to manufacture napalm and what percentage of black employees would be both socially just and in the best interests of the present employees Greater information about the social context and experience in playing the role of the opposing party might help to reduce conflict However it is possible that differences of opinion would only be made clearer and that nothing would be resolved

**Social Indicators Will Have an Impact on Lobbies**

Inequalities among different groups in the population would be repeatedly pointed out by citizen sampling simulations using social indicators Consequently the bringing of group grievances to public attention could become a function of government or the universities just as the resolving of conflicts is now a function of government Interest articulation could become an activity of professionally trained people and therefore less of an additional burden on the individuals to whom injustice is being done The comment mode used in these explorations could help to restore the right of the individual to petition the king People who read the comments could be charged to act as ombudsmen

Social indicators should also help to locate emerging social problems before they reach the critical stage It is not likely however that muckrakers using present media would be put out of business They will have a whole new social activity to criticize

Increased use of social indicators for articulating group demands could help to keep lobbyists honest Indicators of the existing situation would probably

hurt well mobilized minorities such as the American Medical Association and help poorly mobilized minorities such as Mexican Americans and migrant workers

**Political Parties May Become Less Important**

If one assumes that political parties are a social technology for aggregating interests which is required by the fact that there are a large number of interests and a small number of candidates then the importance of political parties could be reduced by a technology which would allow people to register their opinions on separate issues With citizen sampling simulations a substantial part of a citizen s time spent on political questions would be devoted to specifying his hierarchy of priorities or indicating which alternative policies he regards as most important and desirable

**Other Media Might be Reexamined**

The concern with public policy fostered by citizen sampling simulations might carry over to the other media Simply the discussion of computer based citizen sampling simulations even prior to widespread implementation could increase the growing interest in reexamining the educational political and cultural functions of existing mass communications media and their regulatory agencies It is useful to point out again that an implicit national policy regarding the existing media of mass communications already exists even though it may never have been debated and consciously decided upon

For example television could be thought of as an instrument for education rather than for entertainment A device which brings the patent remedy man directly into the living room could be thought incongruous in a society where many communities prohibit door to door selling Also the existing media could be used by each of the many silent minorities to make its case to the rest of the public Mexican Americans students and American Indians are just a few of the groups whose views could be better understood by the public at large

**How Communications Media Affect the Temper of the Times**

The present domestic instability and sense of foreboding in the United States may not be due entirely to a combination of very important social conflicts Each communications medium existing at any particular moment influences the temper of the times by selecting out the kind of information most suited to it Television tends to select events which are dramatic as opposed to events which are representative of the total set of events This situation produces numerous consequences For example if a person wants to be heard he tries to make his comments as dramatic as possible short of what can be prosecuted for inciting violence A very large number of dramatic events bombarding the senses tends to create a feeling of catastrophic upheaval when in fact the daily lives of most people remain largely unaffected

Computer based explorations of future alternatives in a constant attempt to be accurate would try to present both dangers and opportunities Discussions about probable secondary effects would tend to select out the most persuasive arguments as opposed to those most flamboyantly presented



**Will Anxiety be Produced or Reduced?**

The very major change in social communication and decision making proce dures which would accompany the introduction of citizen sampling simulations could cause great anxiety in the beginning However increased information and public involvement in decision making would in time probably reduce anxiety due to unanticipated or unexpected social and technological developments By looking ahead the public could better anticipate the new technologies and thus have time to create institutions to regulate or eliminate undesirable secondary effects Greater confidence in society s ability to control the consequences of social and technological developments could lead to more open acceptance of experimentation and alternative life styles

**Enhancing Self Esteem**

Greater involvement of the individual in social planning could contribute to self esteem Assuming that societies change in a non random way—that is that some progress can be discerned that the store of knowledge grows and that societies tend to become more organized in terms of an increase in information flow—then one might say that each individual simply because he is alive and contributing to social choice is a factor in social evolution if he participates

**Governance by "Those Who Care"**

It has been suggested that a representative sample of the population might not be desirable that a constituency of the concerned might be better than pure democracy Teaching computers raise the possibility of granting citizenship in proportion to involvement Perhaps there is some merit in this proposal but care would have to be exercised to insure that citizenship was not granted in proportion to involvement *through a particular medium* Participating in a citizen sampling simulation might be as uncomfortable for some people as marching in a demonstration is for others

**A Technology for Democracy**
**As Foreign Aid**

In addition to the considerable impact which citizen sampling simulations could have on government within the United States and other industrially advanced nations the same equipment would seem to provide a way for accelerating the process of political development in the newer nations If the people of a nation request it computer based education equipment could be given as aid instead of tanks and guns The device could then be used both for education and for informing people about the operation of their government It might be desirable to have some means of regulation by the United Nations to insure that the equipment is not used for propaganda or for inciting hostilities between nations

**A Shift from Special Interests to Common Interests**

People seem to be becoming aware of the fact that the physical world is not without end but in fact is very limited This realization has very important consequences for political theory Much of the present theory of coalitions is

based on the assumption that some conflicts are of almost no concern to a third party The idea of logrolling—support my bill and I ll support yours—assumes that each partner has no interest in the other person s bill However in an intel lectual climate in which everything is viewed as having some impact sooner or later on everything else the idea of logrolling at least in its pure form breaks down One is forced then to take into consideration more than before which side of the issue will produce the most desirable long range consequences for the population as a whole

Citizen sampling simulations make feasible the detailed consideration of secondary effects both by planners and by the public at large and thereby could assist in arriving at decisions which serve long range as well as short range interests

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# FOR A PROSPECTIVE CONFLICTOLOGY OF FUTURES RESEARCH DEVELOPMENT PROGRAM OUTLINE


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## CHANGE IN MAN'S ENVIRONMENT

The quantitative changes which have occurred in Society during the last two centuries are under our very eyes on the point of changing its nature

During the periods of agrarian civilizations man s environment was produced by Nature

Certainly large cities in the very earliest times introduced a new environment which although limited we are familiar with but since then a demographic explosion and an accelerated urbanism have given an omnipresent feature to our society which moves man entirely away from the natural habitat he knew in ancient times

In parallel fashion more and more complex forms of activity and social organization hem contemporary man in a network of rules and objectives that condition his psychological range of perception and govern his behavior

These two developments—demographic growth and urbanization on the one hand and the larger and larger scale insertion of man into the social structure on the other—have imperceptibly brought about a change or transfer man s milieu has become Society not only in the political sense in which ARISTOTLE understood it but in the widest sense a society constituting an environment which is at once tangible such as water and earth but is infinitely more pervasive and restrictive in every act of life than the natural environment ever was for any species

These remarks today banal lead up to a graver fact

While the natural environment was relatively stable the society milieu is one of rapid development

The things that are changing around us and within us are in fact
-Values
-Knowledge
-Aims and purposes
-Technical means for action

–Social organization (the means available that is for acquisition growth detention conservation transfer and obsolescence of knowledge techniques values and motivations material wealth and especially power)
–The population itself is changing primarily in numbers in its characteristics also and even physically with the progress made in dietetics and medicine and it will probably change more radically still if progress in biology and genetics permits

It is also a fact that the change is swifter and swifter accelerated by the integration of scientific development into the industrial economy

Man therefore sees his frame of reference growing more and more obsolete at the same time as his operational means (let s say his means of action)

The word crisis often used in very divergent types of activity properly conveys this state of things but is not yet generally taken for what it signifies (We try to nip crises in the bud to avoid them etc)

Our vocabulary conveys the traditional notion that a crisis is either a mistake or an evil And in its manifestations it does indeed appear as often as either one or the other

Nevertheless as the facts point out crisis is the permanent and natural state of the society milieu and this will certainly be even truer tomorrow than it is today

In the best few decades crisis has already ceased to be perceived as an accident but appears rather as a process We now speak of a crisis in the adaptation of structures to new conditions for example of a crisis in awareness Thus crisis enters our life and weaves the fabric of our lives

Two facts therefore are borne in upon the forecaster

1) the omnipresent society has become man s environment—the entire surface of the globe is in this sense socialized just as is the whole of human activity
2) and this environment is a critical milieu whose rapid change is its most obvious rule

The consequences of the first fact are only beginning to be envisaged scientifically Works such as those of DESMOND MORRIS are an example of this awareness

The second fact is answered by a concern very old but more and more imperative for the scientific search of this environment s laws of development

But it must be admitted that at the present hour it is not possible to approach the problem in its entirety in any satisfactory manner

If a technological estimate exists an economic estimate an urban pre determination etc relying on scientific considerations and precise methods—any comprehensive social prospective is still largely situated at the philosophical level This is actually the reason existing theories of social evolution are the subject of controversy

Contrariwise precisely under the pressure of events that is of an awareness of them and of the needs coming to light in contemporary society the necessity for a social prospective has become more and more evident these last several years Simultaneously a voluntarist concern is appearing a need to select the course of evolution to fix its purposes rather than to establish its theory

We are heedful for example of technology s effects on human values (work done by the Harvard University program on Technology and Society) This idea that the means which science and technology represent should be placed at the service of social ends is more and more accepted



We are also concerned with imagining the social consequences of the change in knowledge now an economic force on which industries are founded

–Its social form
–Its content
–Its velocity of development
–The fact that it cannot be possessed in static fashion but must be constantly maintained
–The fact that it is no longer *scientific* knowledge but also *social* (actualized socially)

These facts and many others will have—have already had—consequences the analysis of which is now proceeding

But the important thing is firstly that these subjects are approached under the pressure of the rapid development of the means society has at its disposal and of the objectives that the forces composing it have set what is important also is that this prospective is only the response—at the research level—to a condition appropriate to society and permanent and that this condition is a *critical* condition

## SOCIETY A MULTI-SYSTEM ENTANGLED IN THE DIALECTICS OF MAN'S WILL AND ENVIRONMENTAL INERTIA

If some day a science of social evolution exists this science will have taken its point of departure from an analysis of crises procedures which are characteristic of the society fact at its present stage of development And naturally this science will take into account the interdependence of the various factors which combine to form a social system or more exactly the ensemble of interdependent systems which comprise society

At the present stage one has the impression that the work being done only lays the first stone prepares the ground marks the difficulties and imagines the approaches to the problem

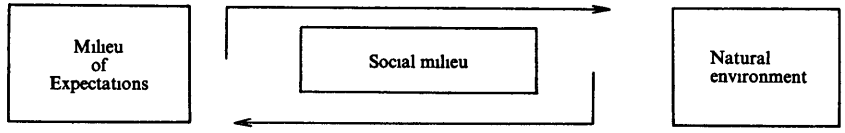
It s precisely at this preliminary stage that I want to try to describe briefly what may be a useful frame of reference for studying this critical milieu which a changing society represents—and attempt to define certain rules for a prospective method which would be conflictological in the sense that it would be based on a definition of society as an area of phenomena development and settlement of conflicts a definition which is therefore dialectical

Dialectics between what and what?

A) *First of all the dialectics of two milieus*

–The one which is within the individual the psychological milieu the milieu of BERGSON s images of memory also which is opposed to matter s degradation of desires finally and of the will which attempts to fashion this matter
–And the external milieu the natural environment physical the one which contains the elements necessary for our biological survival and the resources necessary for our development

The social fact is both internal and external to man it is the universe of




**Man s three milieus**

abstract and concrete means by which man finds the collective solutions to the reciprocal challenge of the natural environment and the internal world of expectations

B) Then the *systems dialectics* whose attribute is to be situated in this intermediary milieu which is the social milieu and to have been generated by the millenary dialectics of the other two milieus

Systems therefore which are interconnected within the system of systems the multi system which is Society and which incorporate an ensemble of factors that can all be defined as the relationships between *man s will and the inertia of his environment*

These systems for the most part still have to be defined today It is important to avoid confusing them with theoretical social functions but to base them on the contrary on actual dynamic forces and internal logic

We may distinguish two fundamental types

–Reference systems that is systems whose internal relationships are the subjective relationships between individuals and factors

–Operational systems systems whose internal relationships are the objective relationships between factors (individuals being included as factors)

The reference systems (systems of values) are for example

–the ethical reference system

–the scientific reference system

–the economic reference system

The operational systems are for example

–the system of Society s technical means of action on the natural environment (and this milieu s response) system of exchange between the society milieu and the natural milieu

–the systems within which the relationships between the internal forces of society are organized that is what we shall call the social organization in a very broad sense

Within each of these systems there are at least six groups of operational sub systems

–System of methods for creating and acquiring

–System of methods for detention and use

–System of procedures for conservation

–Means of growth system

–System of methods for transfer transmission and circulation

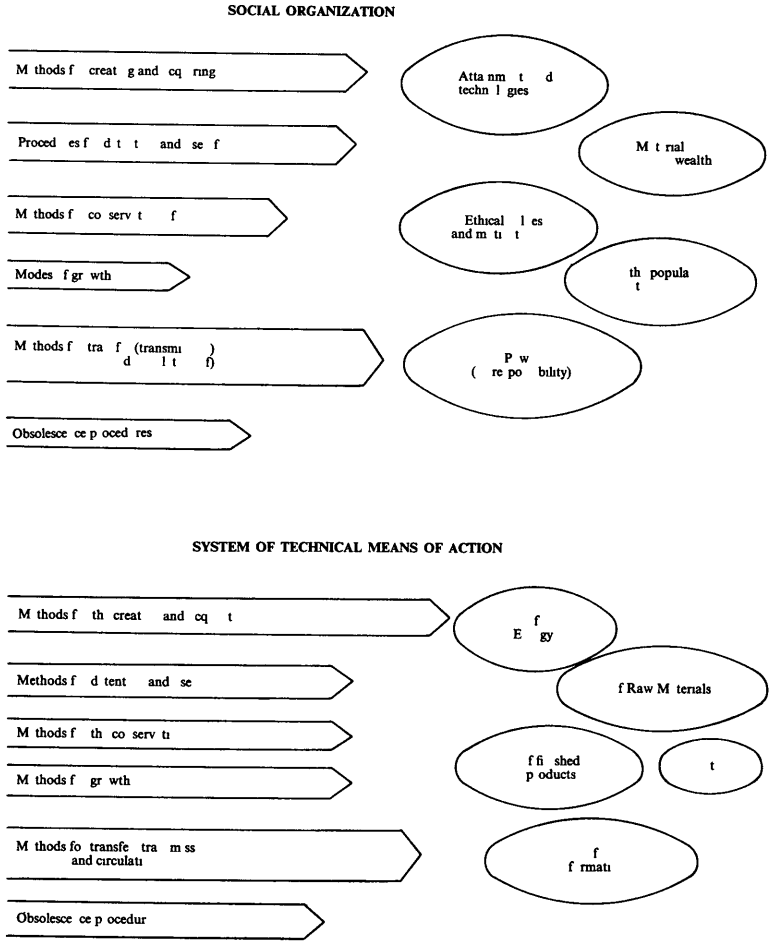
–System of obsolescence procedures

concerning

a) attainments and technologies material wealth values and motivations power or responsibility population in the second system

b) energy raw materials products information etc in the first






Definition of the systems should not be frozen but be as flexible as possible and adapted to the social reality of the given moment But a similar group of social factors obeying a given logic can generally be analyzed in the overlapping operational and reference systems

If we define Society then as an area of conflicts a critical milieu situated at

the dialectical junction of two milieus one of which is absolutely external to Man and the other largely internal and whose relationships generate systems of relationship

1) we see that these systems—reference or operational—undergo development interfere and that the social dynamics merge with these systems development and interference

   If we consider for example the development in Time of the system modes of transmission of attainments we see that it occurs orally in certain eras with some limitations within certain groups then it becomes modified by the appearance of printed books by the principle of the free circulation of information or scientific objectivity and finally it becomes a central and multiform phenomenon in our societies phenomenon which can in no way be separated from the evolution of the ensemble of the other systems

2) consequently if we wish to avoid building up a theory but on the contrary attempt an empirical approach we must return to the first step of scientific procedure that is to observation we must make use of the general observations which precede as a simple provisional frame of reference holding ourselves ready to abandon it if later observation is contradictory

It is evident that the ground on which this observation rests observation which must be the cornerstone of social forecasting is multiple and shifting

a) Recognizably multiple and the observation of each system s development or of each group of relationships between systems will in the future engage the attention of more and more numerous research workers
b) Shifting also since the object observed changes endlessly and the observer also which requires the forecaster to possess a particularly acute sense of relativity

I believe that this complexity only serves to emphasize the need to establish social forecasting on strict rules

These rules must guide us in the observation of reality and dissuade us at every instant from yielding to the temptation which is very great in this field to build up theories They must guarantee the scientific objectivity indispensable to analysis and perhaps some day to the control of this social reality which is our environment

## RULES FOR A PROSPECTIVE CONFLICTOLOGY

### SIGNIFICANCE AND LIMITS OF THE "SOCIETY" MILIEU

What is the significance and what are the limits of the society milieu? One can no longer formulate such a question as a sociologist or an economist or place it within any particular framework of study but one must ask the question today as generally as possible proceeding from an observation of the *facts* and for the forecaster the facts which count are less momentary conditions than *developments*

Therefore if we apply this first rule *to observe developments in the past before analyzing structures in their temporary conditions* what do we find?



**1) First finding**

A simultaneous acceleration of the processes of change which affect all the demographic technological scientific social and economic structures—an acceleration especially sharp in the last 25 years So much so that the notion of society has burst wide open Communal living does not occasion the same results in 1970 as it did a century ago the individual s and the collectivity s rights and duties have changed the social restraints have multiplied at the same time as new means of action have opened up Man s increased power over Nature we spoke a little while ago of the change in man s milieu we can no longer define the social phenomenon in terms of organization only

-Values
-Attainments
-Technical means of action
-Desires and objectives
-Population

and not social organization only are reciprocally involved in the process of change

Hence society appears to us as *less and less a structure and more and more as a process* so much does the process of change speed up structural modification and make structures appear as its temporary means of expression

The notion of structure and the notion of process are nevertheless combined in the idea of system a system being definable as the ensemble of the processes by which a structure changes its condition

From this first finding then comes the idea that the society milieu is a system or rather a multi system and therefore the acceptance of change is a natural principle governing this milieu

**2) Second finding**

If the society milieu submits to change this is not in any gratuitous or chance fashion but is according to a logic which leads us to see in the various processes involved the coherent responses made collectively in the face of a permanent situation It is this situation that I referred to a little while ago when speaking of the two milieus dialectics that is the physical milieu outside man which defies him but which also contains the riches he may extract from it and the milieu which is within man the milieu of expectations and needs the milieu where the responses are made

The social process is an ensemble of more or less satisfactory collective responses generally made spontaneously The very long term task of a prospective conflictology will certainly be to encourage the passage from a spontaneous response system to reflective response systems in other words regulated or controlled

The reciprocal modifications which man s three milieus transmit upon each other should also be emphasized

### THE SIGNIFICANCE OF CRISES

We should note that even if the response systems are some day regulated or controlled that will not change the dialectical character of the social fact which will go on defining itself as the settlement—eternally recommenced and diversely

interpreted—of a crisis of which man is both the end and the origin as a phase of his dialogue with his native environment

Such a control will perhaps achieve in compensation a reduction in the shocks and noise that are caused by the sort of responses we make today—an internal harmonization of these

A crisis in the restricted localized sense is born of evolution s *disparities* not easily manipulated whether these disparities exist between factors of one and the same system or between various systems

By means of a system we can conveniently reset the change motor to the acquisition of information In this regard we note today in the reference systems that there is a considerable disparity between the massive acquisition of informa tion in the method for attaining knowledge and the relative poverty of new infor mation in the ethical and ontological systems

This disparity is not without effect on the operational systems development and the disparities peculiar to these systems (disparities in wealth knowledge power for example) naturally have repercussions on the reference systems

If the disparities are too serious the tensions they produce in a system may lead to the latter s break down The teaching system is today subjected here and there to very sharp tensions

The solving of crises rests generally in the resorption of the divergencies be tween systems this resorption never bringing about a perfect alignment of the systems whose development is slower with the systems whose development is faster—and this irrespective of the development s meaning and character

Social development understood as the evolution of an integrated system of response to the natural environment has taken place historically through the process of acquisition of information by the social multi system whether his attainment was accidentally acquired following changes in the natural environ ment was imaginary even or had been the subject of systematic and objective research

This acquisition of information unequally dispersed within the multi system is expressed in concrete situations peculiar to each system situations from which proceed the various social structures at any given time

Therefore it is the inequalities in the acquisition of information between society s various systems that have always generated the disparities between systems or within each system and hence created continuous crises (in the restricted sense) in the social system The crises confronting advanced contempo rary societies result from a series of fundamental disparities from which many others derive for example

- -disparity in scientific and technical development (and even simply in the scientific turn of mind) between various fields or sectors of activity
- -disparity between the expectations—the demands—of the various social groups founded on reference systems that are diversely evolutionary and the possibilities—the offers—of less evolutionary political and economic struc tures
- -And obviously disparities in training standards of living responsibilities between social groups and national groups

In this respect for example we may consider that a particular global economic system acquires little information—is therefore only slightly evolutionary if the



terms and conditions under which acquisition detention transfer etc of wealth practic alknowledge and economic power develop only slightly —acquisi tion of information constituting the test of these terms and conditions develop ment We may thus establish the fact that a profession which is constantly exercised without recourse to new knowledge without discovering new fields of application or new outlets whose members are recruited according to fixed rules is generally a stagnant profession

For all these reasons the fundamental structures of society should not there fore appear to us as being social groups the stratification characteristic of an epoch and which establishes itself on a condition or a form of technology or more generally on the form of relationship with the natural environment which society as a whole technically maintains at a given moment Of course these structures are important but not so fundamental as the disparities of all sorts which appear between and on the inside of these structures and which determine their change of condition

The fact that these disparities can be conveniently attributed to quantitative differences in the acquisition of information by the systems in no way diminishes their extreme qualitative diversity nor the situations of conflict which they engen der

Inside the milieus dialectics the crises that social evolution passes through are therefore an entirely normal process which a deeper knowledge of the soci ety milieu may perhaps allow us better to control some day but certainly not to cancel it

## RULES FOR CRISIS OBSERVATION

The observation of crises is therefore not only a legitimate preoccupation but this observation is essential to our understanding of the social fact

And if the first rule which should guide us in this observation (to observe the developments before analyzing the structures) makes us aware of the processive nature of social reality other rules are necessary to help us unravel the skein of disparities in the developments as soon as these are exposed

First this one *the legitimate care to quantify the factors should not take priority over the search for the logic inherent in every social process* In fact a logical prospective approach consists of defining the systems checking the factors which intervene in these systems analyzing the disparities which appear between them and the relationships which unite them —but this beautiful edifice often risks leading up a blind alley

-Either because of the impossibility to quantify a certain number of factors

-Or failure above all to perceive these relationships as a whole

Now more vigilance is generally exercised with regard to the first obstacle whereas the second is certainly more formidable

To pay special attention to the detection of dominant processes that is those which bear the gravest future consequences for a certain number of systems is certainly the first way to follow the rule that has just been given

Hence scientific and technological development is apparent to all of us today as a dominant process the reference or operational systems it affects are those which in the social multi system acquire the most information and transform themselves the most rapidly—and there are no crises in our present societies alien

to such disparities in development between such systems and others even if the disparities also proceed from other dominant processes but to suppose that one has succeeded apparently in outlining a crisis logic—for example the crisis in the teaching system—by reducing it to an ensemble of relationships between systems and the factors in each system one cannot be sure that an essential factor although inapparent has not been neglected perhaps due in particular to the manner in which the problem was set forth

The determination of dominant processes though useful is still insufficient and the third rule we shall propose is the following *the search for logic—even for a process whose scope is apparently limited—must be based upon a critical examination of the disparities one has been able to discover in the whole of the social multi system*

The awkwardness of such an approach is certainly the biggest handicap of social forecasting but to ignore it would amount to pretending to ignore the multi system s complexity

## THE CHARACTER AND LOCALIZATION OF CRISES

A prospective conflictology should set itself the objective both of localizing crises in space and time and defining the character of these crises that is attempt to forecast the responses which society will give in future situations defined by a particular condition of the expectations milieu confronted with a particular condition of the natural milieu conditions which result of course—both of them—from prior reciprocal relationships

Forecasting the nature of crises covers the ensemble of forecasts with regard to the perpetuation of the present disparities or the appearance of new ones In this domain starting from hypotheses of the evolution of certain factors we can project outlines of disparities that serve as a framework of consideration For example one can envisage the effects of nonlabor activities (in the broadest sense leisure) if these are multiplied on the ensemble of the multi system in advanced societies—effects at the ethical political economic levels

The search for localization in time and space of estimated crises will be more difficult for example everyone today can foresee that training problems will become more and more serious in the next decades We can encompass quite exactly the tensions which will appear in societies where these problems have not been resolved But to say in which countries in which structures in *precisely* what years social crises centered on these problems will occur cannot be foretold with any exactitude

If the framework for a prospective conflictology must be envisaged in very broad fashion its approach will still in large part be qualitative for a long time to come But perhaps its principal role is precisely that of taking our reflection out of narrow and mistakenly precise settings where the real problems are often obscured and of drawing our attention to ruling dynamic forces that of teaching social man who is more and more caught up in a sort of utilitarian fatality to dominate the network into which his life is meshed

Our epoch is living through the experience of an intense accumulation of knowledge and technical means coupled with the incapacity to mobilize them rationally for the greatest possible benefit to man (this problem central today can certainly be formulated in concise if not brutal fashion What is society



going to be capable of doing with science? )

Never have the efforts at rationalization and forecasting been so great however but these efforts are generally made in the realm of thought or are applied to extremely specialized areas To approach real problems such as for example the definition of individuals real needs that of social finalities and more simply the rationalization of scientific development or the definition of a world wide policy of Energy to approach such problems as these supposes that many psychological and social conditionings and partitionings will have been transcended It is precisely this which a prospective conflictology invites to

Perhaps the forecaster s role is not only that of drawing attention to these problems of helping to perceive them in as large and as unconditioned a framework as possible but also of putting a real psychological and moral pressure on the responsible persons placing them face to face with the consequences of evolution they are subjected to or in regard to which it is not yet customary to adopt an attitude of scientific objectivity

# FORECASTING AS AN AID TO PLANNING —A FEW CONCEPTS—

ULF LANDERGREN
*Head of Materials Division the Research Institute of National Defence*

Futures research can be engaged in for many different reasons It has a value of its own as any other scientific endeavour It can also be used to improve communications between agencies which normally do not communicate well it can be used to create an opinion for a certain cause etcetera

In my opinion however a picture of the future—a forecast—has its greatest relevance in connection with a decision or a planning situation—which I would like to call a planning object

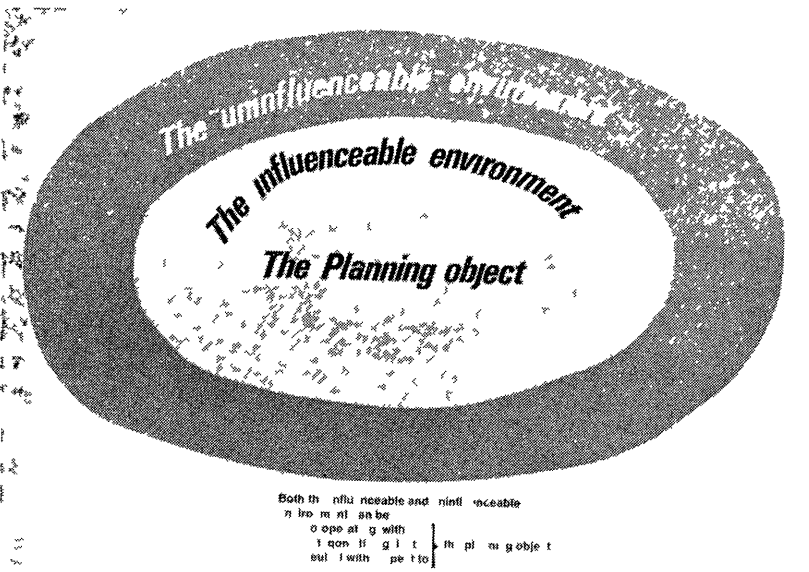



Fig 1

Whether it is a question of world planning national planning corporate planning or any other type of planning the planning object must (or should) take into consideration future changes in a more or less influenceable environment Of course there is no sharp dividing line (or lines) between the part (or parts) of the environment which can somehow be changed by the activities for which is to be planned and the part (or parts) of the environment on which these activities will have no or very little impact I submit however that it is often practical to try to draw such a line and thus divide into two parts the environment for which you intend to make forecasts The two parts of the environment I would like to define in the following way

The influenceable environment—within which the planning object lies—is that part of the environment which can be changed by and can change the activity for which is to be planned

The uninfluenceable environment is that part of the environment which only to a minor extent can be changed by—but which can change—the activity for which is to be planned *

I believe it is also important to realize that both the influenceable and the uninfluenceable environment can be

co operative with
antagonistic against the planning object
neutral with respect to

Depending on the extent and consequences of the planning object the changes in both the influenceable and the uninfluenceable environment must be studied in little or great detail and in a short or long time perspective

The changes in the influenceable as well as in the uninfluenceable environment consist of many types of changes with complex relationships where the focus of attention until recently has been on technological and economic changes and their interconnection What futures research now increasingly has to do is to study the coupling of technical and economic changes with social and political changes and—very important—with changes in values in individuals and groups of individuals A discussion of values should in my opinion play a central part in every (integrated) forecast Such a discussion is of utmost importance for the goal formulation of the planning object

The point I now want to submit to you is the following

Forecasts about the uninfluenceable environment should mainly be concerned with the more likely developments Such forecasting implies a deterministic point of view on the part of the planner or decision maker Since I cannot influence that part of the environment I must try to come as close as possible in deducing the true future development of it A good forecast about the uninfluenceable environment is then one which later is shown to have described the development accurately

Forecasts about the influenceable environment should—on the other hand—be concerned not only with likely developments but also with possible not necessarily likely developments as well as with desired developments (goal oriented

*Of course there is also an environment which is neither influenced by nor has any influence on the planning object But in forecasting we do not have to concern ourselves with this part of the total environment



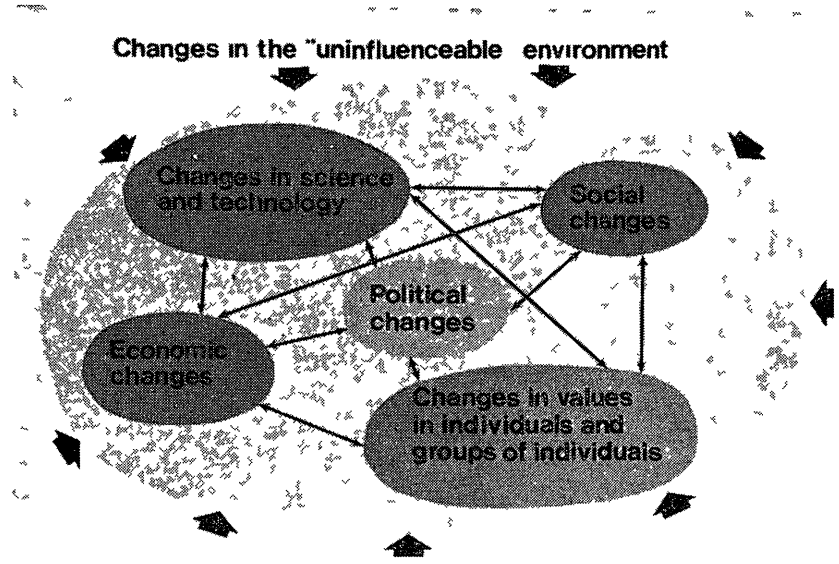



Fig 2

forecasts) For a good forecast about the influenceable environment it is of minor importance if it comes true The decision maker or planner will want to avoid or weaken forecasted negative trends and strengthen positive trends and will thus decide or plan so that the forecast does not come true The important thing is thus here if the forecast can be used in the decision or planning process

From the above follows that it is important for the decision maker or planner to be able to judge the forecast with respect to both credibility and usefulness In order to be useful a forecast should in my opinion not only contain the forecasted picture or pictures of the future but should also contain a description of

- -aim or intent of the forecast (containing explicit value discussion)
- -system level time horizon and other types of limiting factors employed
- -forecasting technique used and assumptions made
- -instructions about how the forecast may be used in the decision or planning process

If it fulfills these requirements the forecast can more easily be integrated in a decision or planning process

# THE PROCESS OF GOAL FINDING AND GOAL ANALYSIS IN SCIENCE POLICY

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## THE NATURE OF THE PROBLEM—ATTEMPT FOR AN ISSUE MAPPING

> Whether we entrust our decisions to machines of metal or to those machines of flesh and blood which are bureaus and vast laboratories and armies and corporations we shall never receive the right answer to our questions unless we ask the right questions
>
> —Norbert Wiener

This paper is a personal opinion of the author on the complicated problem of goal finding and goal detection in science policy gained in various professional activities in research planning with the purpose to invite and to stimulate discussion Assessing a goal s social relevance means establishing a number of values Those values can cover a very wide spectrum from the desire for power to the pursuit of mere knowledge from the socially common good to the fulfilment of everyday needs Each science activity may be regarded either as a more general contribution to knowledge or as being focussed on practical political or social objectives

1 The recent studies on technological gaps between Western Europe and the United States carried out by the O E C D has revealed the importance of public goals in promoting technology especially the science based industries Goals in this context are defined as help for decision making which offers alternative choices for action and not as challenges broad national objectives or long range views for policy making The purpose of such a goal evaluation is not to stimulate Utopian ideological ideas but more realistic workable ones

2 Also the experience of the United States in the field of science policy reviewed by the O E C D [1] shows that government programmes for scientific and technical co operation bringing together government industry and the scientific community can do much to help in overcoming traditional movitations

[1] O E C D Reviews of National Science Policy United States Paris 1968 E 20 347

and attitudes as well as institutional rigidities The effect of this focus was certainly to raise the general level of preparedness for or adaptability to tech nological change

3 More and more and rather reluctantly science of today is to provide government and industry with a more rational framework and a more systematic approach in carrying out their activities Science has partly become a common input for all planning processes especially the management of technology in modern industrialised societies Science policy is becoming more and more related to and dependent upon the network of international communication competi tion deliberation and co operation This new aspect of science policy creates new difficulties and imbalances but at the same time has in the last two decades quickened the pace of progress in science and technology as well as of change in the pyschosocial environment and in governmental and industrialised structures This process was to a large extent the answer to a challenge arising from the power structure and not a deliberate effort to cope with growth processes of industrialised societies Almost two thirds of the cost of technological change was financed in the U S A by defense programmes The R & D expenditures of the United States Federal Government in the last two decades have been closely linked with the cold war It might therefore be reasonable to ask if this challenge clearly expressed in the military doctrine of the balance of deterrence could also arise from civil technology programmes stimulated by social problems and objectives The focussing effect of military challenges seems to be until now greater than potential challenges arising from basic social needs In the post war years science may have lost some ascetic values as they were defined in the Humboldt Founding Memorandum for Berlin University in 1810 but on the other hand it has gained a new dimension namely the capacity for solving problems of a difficult and complicated social nature Today more than ever before science is confronted with the results of technological change The whole array of new social sciences is faced with new tasks of eliminating disparities and imbalances and stabilising processes of change all part of the process of adapting society to the results of scientific and technological discovery and innovation

4 For example in the fields of information education environmental health computer programming and city planning the impacts of new tech nologies are interrelated and can be communicated that is they are all part of one broad socio economic system which depends on international communica tion cooperation and system wide planning

5 Policy *through* science (and no longer policy *for* science) is the only method for placing the introduction of new technologies and the problems arising from them in a social context During the last two decades society has been faced with a growing number of environmental threats many of them by products of the newly introduced advanced technologies These threats can be met only by a rational framework for decision making based upon modern management tech niques plans for future social systems and the experience of big science in R & D planning and technology management

6 Industrial societies are technologically advanced societies Their problem solving capacity has increased tremendously but at the same time so has the threat of deterioration Also the interrelatedness and interdependence of all



political decisions have become greater In Sweden a technologically advanced country more than fifty per cent of economic growth can be attributed to expor tation of goods produced in the science based industries This being so the for mulation of public goals in science policy is not only an important but an indispensable planning device for ensuring future economic growth Daniel Bell speaks about a coming post economic age [2] which means growth must be redefined in the sense of inventing new opportunities

7 As recent economic theory shows technological change results either in a change in the production function or in the availability of new marketable products So far there is no satisfactory way to measure directly and precisely the processes of technological change Economists *quantify* the *effects* of these changes There is agreement however that the rate of innovative performance and in turn of technological change in a given industry depends to a large extent on the total mount of the expenditure allocated to the general improve ment of the industry s technological potential and problem solving capacity Clearly focussed government programmes in science and technology is one means of bringing about this general improvement The amount of resources spent by governments in fields of civil technology depends upon how directly the industry can contribute to resolving social problems or meeting social objectives for which governments assume major responsibility e g city plan ning health education The amount of resources also depends on the extent of the external economies generated by the relevant research and development but here more and more the impact of government policy is felt on investment policies in industry According to Gottfried Bombach and Edwin Mansfield the amount of resources devoted by industry and independent invest depends heavily on the anticipated profitability of their use The rate of innovative per formance (and subsequently of technological change) depends upon two sets of factors (1) those influencing the returns from certain foreseen technological changes and (2) those influencing the cost of making these changes Among the first set of factors are the scale of production and the structure of input costs among the latter are advances in oriented fundamental research

8 To day in the science based industries we find oligopolistic market structures Here very often a firm has no choice but to innovate to survive In this situation individual firms need national guidance in determining goals in technology Assessment of firms objectives trends for future technology transfers formalized management information and management training in general are all forms of such guidance Chris Freeman quotes the Chief Executive of Rolls Royce as saying Building a new engine would not guarantee that we stayed in business not building one would certainly guarantee that we went out of business General Electric experienced a similar situation of uncertainty when it was faced with the decision to continue the development of nuclear reactor power plants which in the past had not been profitable The Concorde and supersonic aircraft projects are examples where the survival of the aircraft industry in future markets is considered to be an important national goal One could say goals in science based industries where scientific and technical re

[2] Daniel Bell The Post Industrial Society in Eli Ginzberg ed *Technology and Social Change* New York 1964 p 44

sources are applied are a function of the conditions resulting from the use of such resources A very rough guide line for rational decision making in industry would be an assessment of government commitments in military of civil tech nology In the United States in 1964 industry as a source of funds accounted for 30 7% of total R & D funds industry received however 70 5% of the total The Department of Defense NASA and the Atomic Energy Commission ac counted for 85% of U S government total expenditure on R & D From these figures it can be seen clearly that priorities are given to military technology and to space and nuclear energy Goals in these three areas serve as objectives for which governments spend big money

9 In the past big money allocated to defence and space programmes did not necessarily imply the existence of a rational basis for decision making nor does it imply such for the future Neither the Western European countries nor Japan ever spent as much on defence technology as the United States The United Kingdom and France spend about half as much measured in percentages of total national resources spent for R & D and Germany spends even less than the United Kingdom and France Presently there is general discussion on the question of how to re evaluate the allocation of resources The sharp increase in the science budgets of the Eisenhower and Kennedy administrations has been levelled off during the Johnson administration The continuous growth of science budgets led Alvin Weinberg in 1961 to ask the pertinent question Is big science ruining us financially? [3] In other words are the present methods of goal detection in science policy optimal? Weinberg says at the present rate we shall be spending all of our money on science and technology in about 65 years Both our military and our scientific might are instruments of national policy It therefore seems to me that the general principles which have guided our military fiscal policy should be useful in guiding our science fiscal policy Weinberg suggests something less than 1% of GNP as the long term figure for American federally supported non defense science The conclusions to be drawn from this line of thought are as follows budgets for science and technology must be part of a broader planning process science and technology cannot in the future progress alone and for their own sake following the wishes of researchers or some projected trend line science policy is an important part of the infra structure planning processes in society

10 At the same time the science policy decisions taken by government affect public and private investments consequently there is need for relating the management of science resources to broad social and economic criteria The integration of science policy into a broader social context and the increasing interrelation between science policy and economic social and educational policy pose extremely complex planning problems which will necessitate a new framework for decision making at government and industry levels New manage ment techniques based upon ideas from various disciplines such as operational research cybernetics or systems analysis and the management and social sciences make it possible to conceive and understand human society and its environment as a system the uncontrolled growth of which might well give rise

[3]Alvin Weinberg Impact of Large Scale Science on the United States *Science* Vol 134 21 July 1961 pp 161–164



to disparities deterioration and social frustrations There is no automatic self regulating mechanism built into present day industrialised society for the control of macro economic or macro political processes Only by careful and deliberate system wide planning can imbalances frustrations or catastrophies be avoided The world today has become a man made world in the strictest sense there is no part of it which is not affected by deliberate man made decisions (e g natural resource preservation laws water management work in international organisa tions etc )

11 Today science policy goals are to some extent measures designed to counteract disparities imbalances and gaps Science policy must respond more actively to concrete problems many of which are problems of technology man agement such as air pollution water management automated traffic control programmed instruction new city construction telecommunication system designs and information management systems Science policy can only achieve those new objectives in a framework of system wide planning

12 According to Hasan Ozbekhan s thinking [4] three levels of planning can be distinguished normative strategic operational

a) *Normative planning* or planning for policy making At this level of plan ning goals are defined as a basis for general policies Normative planning deals with the consequence of evaluation hence with the delineation of qualitative futures One should speak rather of goal patterns or planning structures or means of extending the Ozbekhan idea of anticipation of pos sible futures which he has defined as ought to The interrelated simulation models of the various possible futures must be based on all available informa tion concerning technology trends demographic factors etc and be deter mined in a continuous experimental process By means of a learning process with a built in feed back alternative models of possible futures will be created on the basis of experience gained Science policies are selected according to ideas of the ought to and on a strictly comparable basis All science policies should remain subject to technological change and operational refinement

b) *Strategic planning* It is at this level according to Hasan Ozbekhan that alternative policy options for the achievement of concrete missions or goals are conceived Strategic planning is oriented towards the can All kinds of feasibility studies proposing alternative possibilities are introduced at this level

c) *Operational planning* or planning for tactical decision making At this level the decision making process is introduced The different alternative and feasible actions are reviewed and the best policy course for concrete imple mentation of the chosen strategy is selected Strategy in this context means a set of guide lines for decision makers which gives them alternative choices for action

13 Goals in science and technology should reflect all three levels of plan ning The special rule of science policy in the future planning process will neces sitate a new and more stable institutional framework within industry and government Effective communication channels must be established and a learn

[4]Ozbekhan Hasan The Triumph of Technology Can Implies Ought SDC paper SP–2830 June 1967

ing process introduced between the scientific community government and industry at the policy making strategy definition and implementation levels Goals in science policy would then be the result of the dialectic process of redefining modifying and reconstructing the first notion of the ought to there will be more of a goal detection process involved and not just strict implementation of a given normative objective This learning process will include a simulation of probable technology transfer processes an assessment of the social effects resulting from the introduction of new technologies a new definition of minimum standards and values of life a re evaluation of the theory of economic growth and of the professionalized educational system

14 The Modern World has been shaped by science and technology and only they can provide the necessary tools or planning techniques to balance the complex real systems of communication trade urbanisation education etc Many problems of future technology assessment remain to be solved

15 In September 1967 the U S House of Representatives Committee on Science and Astronautics invited with ten consultants for a seminar on technology assessment They agreed at this meeting that for evaluating problems of future technology transfers the professional competence required is not confined to the field of technology social and economic and even moral and aesthetic values must be considered as well Technological forecasting must be done on an inter disciplinary basis focussing to a large extent on follow up problems this means analysing the effects of new technologies on the social and political environment There is already increased concern about the future value of life human environment and long term objectives of society in general (See for example Galbraith s *The New Industrial State* the work of Bertrand de Jouvenel and the French Centre d Etudes et de Recherches sur l Amenagement Urbain or the publication of the Commission on the year 2 000 of the U S National Academy of Arts and Sciences ) There might be a shift in priorities in the next decade from traditional security and power structure problems (including economic objectives related to the nation state notion) towards new social and political goals (e g humanisation of modern society international co operation closing the gap between developed and less developed countries etc ) However Galbraith s and Daniel Bell s vision is not accepted by all people Future application of sophisticated goal finding methods will depend heavily on the success of present efforts to assess in a normative way future technology transfer and its social environmental and ethical impacts

16 The key to better understanding of the goal finding process is a proper viewpoint the decision maker should have both overall Gestalt view of the goals to be pursued and their political economic and social interrelations and at the same time the capacity to understand a break down of the various planning elements (sub goals critical paths available resources concrete projects etc) which together make up the goal problem The limitations of our economically oriented statistical tools and the value of other social indicators (such as human environment innovative climate incentives for professional mobility etc ) have been argued by John Galbraith Olaf Helmer Erich Jantsch in Paris and Bertrand M Gross at Syracuse University

17 There are other examples of rational goal selection For instance in France/Germany or the E E C in Bruxelles The Fifth French Plan (1966 to



1970) establishes a financial resource pool to aid industry in launching certain projects in advanced technology Plan CALCUL has as its goal the building up of a French national computer industry in ten years time The German Federal Government announced in two research reports (1965 and 1967) specific goals The need for rational decision making in science policy using modern information technology and the systems analysis approach is realised in this report However no indications are given concerning implementation time schedule costs or priorities Also the review of possibilities of co operation between the Common Market countries is a first tentative endeavour to formulate multi national goals for European science policy

18 Many questions remain to be answered At present all sorts of possible goals (national and multi national) are being discussed What is lacking is a coherent systematic and continuous effort to analyse these different goals and relate them to the present resource structure and the existing institutional framework The object of such a systems analysis undertaking would be to present to national governments and international organisations recommendations on goals to be pursued resources needed the management effort necessary and the most likely results

19 At the same time there should be a continuous review of basic technologies (information nuclear energy transportation environmental etc ) to inform decision makers on possibilities alternative strategies and foreseen trends or impacts for the near future One immediate possibility is the use of *demonstration projects* which set a model for industry or government programmes in advanced technologies The German Federal Government is employing these projects in its nuclear energy programme for peaceful purposes and also recently in its data processing programme The idea is to demonstrate for industry and government agencies in limited and specified projects possibilities and alternative applications of new technologies for the near future The educational or stimulating effect of such demonstration projects raises the level of technological readiness improves management methods and gives industry and government a better idea of future prospects for advanced technologies For instance the demonstration project sodium cooling system in nuclear reactor technology (partly financed by EURATOM) tested new ideas and proved that costsaving value was less than expected Through this project industry was given sound guide lines for better allocation of investment funds Another demonstration project Re organisation of the Munich Patents Office will test present information retrieval systems and show how information flows can be improved in administrative and bureaucratic systems

SPECIAL SESSION

# PERSPECTIVES ON MULTI-CHANNEL SOCIETY

# HUMAN REVOLUTION – MULTI-CHANNEL SOCIETY

JUNNOSUKE KISHIDA
*Editorial Writer Asahi Shimbun*

## THE OVERWHELMINGLY INFORMED SOCIETY

We live in a world of accelerated change In terms of the quantity of informa tion produced the number of technical papers written has doubled in ten years which means a thousand fold increase in one hundred years It is reported that the number of books in libraries is doubling every fifteen years which means a hundred fold in one hundred years or a thousand fold increase in one hundred and fifty years It is such an overwhelming increase in our information which has given rise to the term the informational society

While it is impossible to tell how long this kind of exponential function increase will last it may be generally stated that increase curves take an S form and reach saturation in time But as far as the production of information is concerned we are now at the initial stage of the S curve or in the stage of exponential function increase This trend may be seen not only in the amount of information produced but also in increased long distance telephone and wire less telecommunications air passenger miles flown the number of passenger vehicles registered etc (Cf *The Measurement of Knowledge and Technology* by Daniel Bell) All these things are related to the transmission of information In other words it is evident in every aspect that we now live in a world overwhelmed with information

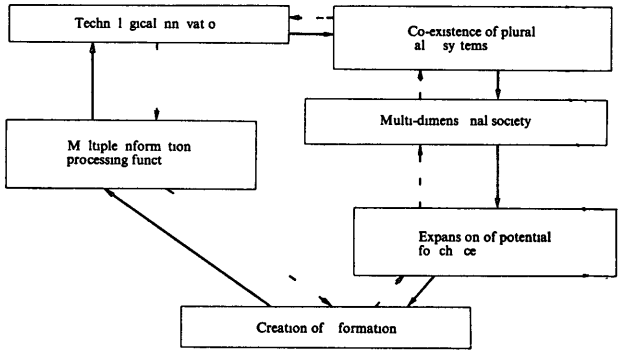
All the phenomena of the world are composed of the three elements of matter energy and information Of these matter and energy have apparent limitations in that they depend upon the natural resources of the earth In contrast there are no limitations on information It is created by man and it can be accumulated with the passage of time The amount of information can not but increase with the expanding scope of human activities and the progress of human society And such overwhelming increases in the quantity of information are linked to rapid change and innovation

Such a world of rapid change with its many characteristics which shall be dealt with later is understood as a multi channel society The informational

society is that multi information society which follows the industrial society an affluent society supported by innovation in a wide range of technical fields and a society in which plural value systems must inevitably co exist People there have their choice At the same time this technological innovation is further accelerated by the premise of coexistence of such plural value systems This is because rapid innovation is contingent on a tolerance toward new value systems different from those of the present different from the existing technological and social systems

New technology frequently acts as a disruptive factor in the existing society This means that the new technologies bring new and heterogenous systems of values into the existing value systems Only the society capable of embracing new value systems can really enjoy the fruits of technological innovation In order to achieve technological innovations the society must be capable of permitting the co existence of plural value systems The multi channel society being brought about as the result of technical innovation s development technological innova tion is further accelerated in the multi channel society

This may be schematically expressed in the following




The technological innovation gives rise to the co existence of plural value systems which results in the multi dimensional society with expanded oppor tunities of choice This is called the informational society As the amount of information thus increases it becomes necessary that there also be an ability to process multitudes of information on the receiving end This anticipates tech nological innovation and changes in the social structure At the same time the possession of the information processing function by the recipient of information enhances the new possibilities for further technological innovations and this in turn brings about a state of co existing plural value systems thus completing the cycle (as shown by the solid line arrows) Because the reverse cycle is also plau sible this has also been shown (with dotted line arrows)

## POPULARIZATION OF THE INFORMATION-PROCESSING FUNCTION REQUIRED

Such a multi channel society has several outstanding characteristics The first characteristic is no doubt the vast quantity of information As we have seen



earlier the phenomena relating to information increase in geometric progression Today s society is supported by the collection dissemination and processing of vast quantities of information Technologically the communications network and electronic computers are the typical proponents of such society

From this however new tasks emerge That is man in the informational society must have information processing means commensurate with the increas ing amount of information being produced If the production of information should increase and the information processing means remain deficient man will be faced with a phenomenon which may be best described as informational pollution

Originally such environmental hazards were the product of mass production industry Mass production unaccompanied by commensurate means of process ing the industrial waste inevitably creates hazards in the environment Air pollution and other environmental hazards are part of this and such pollution became more serious as industrial waste from the mass production factories was only loosely controlled Among the waste plastic is the latest addition to our problems for here too the technical means of processing the waste is incommen surate with the levels of production

While these are visible hazards the mass production of information too will create similar problems The informational society must be equipped with the appropriate means of processing information

As it is society is not so equipped One cannot say that the means of processing information in our society are developing in pace with the increase in the amount of information In Japan university students are acquiring a taste for comic books This may be interpreted as a phenomenon arising from their deficient means of information processing in the informational society Comic strips contain more information than do words In a way this is similar to television which contain and transmit more information does radio and printed matter Besides comics can be read in shorter period of time In other words comic reading may be considered a distorted response by university students to the deluge of information

What is needed is a more normal means of processing information Prerequisite to the informational society is the popularization of technical information processing systems centering around electronic computers One should not forget here that such means of information processing should not be monopolized by a select stratum of people but must rather be available to all of the people

Among the things to be feared in the information society is the possible gap between the intellectual elite and the rest of the people—the segregation of people between a managerial group monopolizing information and the manipulated masses If the means of information processing are monopolized by the Govern ment the society will be a completely administered society This can only lead to dictatorship By the same token if the means of information processing are available only to business management and not to the other people in the busi ness they will develop a sense of isolation or alienation and feel they are only part of the machine

In order to avoid such dangers to which the informational society is liable various steps need to be taken in connection with that information processing system using electronic computers Firstly it is necessary to provide as early as

possible a system whereby the general public can effectively utilize the informa tion processing means What is necessary here is the creation on a national scale of an information network and the technical preparations that must go with it

In this scheme for the creation of a national information network data trans mission utilizing telephone cables is of relatively high technical feasibility Next in line of practicability is data transmission through cable television In order for these new technical means to develop and become popular quickly it is necessary that adequate reorganization of institutions and technical development planning be carried out simultaneously

Furthermore so as to allow everybody access to electronic computers it is imperative that an electronic computer system which is easy to use be quickly developed Electronic computers are at present extremely complex and difficult to use To be able to use them one must undergo somewhat professional training This is indicative of the present state of the electronic computers and it may be said that they are still at an extremely primitive technical stage The fact remains that the means to be used by the general public should not be such as to require special training on the part of the user

The complexity of the machine itself is partly responsible for that human alie nation which has become a serious problem with the increased use of electronic computers As man is a malleable being he is capable of adapting to a certain extent of new situations Nevertheless that there is a limit to this human capacity for adaptation must be evident to any observer Therefore one should not expect professional capability of the general public

More often than not engineers are more interested in developing the machine s capacity than in developing machines which lend themselves to use by the general public Hence the problem of human alienation The goal of the electronic computer technology should be the development of a situation where the mere operation of simple terminal equipment as simple as the typewriter can effec tively process the required information without complex discussions of soft ware hard ware and the like There are a number of tasks to be solved by engineers in order that the means of processing information may be accessible to all

Yet not all information processing can be handled by technical means Electronic computers are capable of processing only standardized information It frequently happens that the kind of information useful to creative activities cannot be processed by electronic computers This is because the cycle is one of new information s being standardized into a form which computers can use the use of that standardized information s advancing society s informationaliza tion and then that s stimulating creative activities to the production of new information Such opencircuit information is of great significance to the development of the rapidly changing informational society In order to process this kind of information for one thing a new kind of training must be given suited to such requirements This is a kind of training entirely different from such training as instruction in how to use electronic computers It is a kind of training which will develop the ability to differentiate the useful from the ir relevant information Training for information processing in the informational society ought not be oriented toward electronic computers Instead it must teach how to choose useful information from that new information which com



puters cannot handle This points up the need for a new educational system oriented to the multi channel society in a multi information age

## THE RAPIDLY CHANGING SOCIETY

The second characteristic of the informational society the multichannel society is the rate of change The rapid succession in which new information is constantly created is indicative of this rapid rate of change People must be trained so as to be able to cope with this fast rate of change Also necessary is the ability to anticipate future changes and prepare to cope with them In such a society there will be an even greater need for technological forecasting and the anticipation of future developments

Nevertheless since it is not possible to anticipate everything nurturing men talities which allow flexible adaptation to whatever changes may take place will still be prerequisite The same is true of private businesses and other organiza tions At the U S Japan Futurology Symposium Perspectives on Post Indus trial Society held in Tokyo in September of 1968 the American Donald Schon gave his detailed views on this point (Donald Schon Technology and Social Change ) Schon stated that the future society would be formed in the infinite variety of actions preparing it for adaption to the process of change itself

Those are (1) not failing in the face of new institutions and changes but responding with flexibility (2) attaching greater importance to processes than to products (3) attaching more importance to the network s organization than to its organizational components (4) shifting the emphasis from products to sys tems and enlarging the total integral scale of organization and (5) shifting the value outlook from one based on the physical to one based on the process of change itself In this age of rapid change man must adopt a life attitude of finding value in change itself

Rapid change inevitably brings about many problems The greatest of these will be that of imbalanced development By nature change and development cannot be initiated without anticipating a certain degree of imbalance Even though progress from one state of stability to another state of stability may be desirable efforts for change inevitably act as a factor for instability The faster the pace of change the greater is the possibility of imbalanced development From this emerge such problems as human alienation or environmental hazards The generation gap is no doubt a part of this picture In the days of slow change there was not this discontinuity between generations This is because new generations came into positions of responsibility before such or alienation took place Such is not the case at present We are now faced with a situation in which many generations co exist with discontinuity between them

There is however a certain saving grace in the fast pace of change in the information society in that the change is metabolic rather than discontinuous and metamorphic The more modern a state is the greater is its difficulty for revolutionary change Individuals business enterprises and communities are so closely interlocked that a revolutionary change in one part exerts an extreme impact on other parts with all its implications of new danger Consequently it is difficult to initiate actions without minute calculation as to what effect individ

ual actions will have on what part Even if there is frustration concerning the present state of society the informational society is characterized by gradual changes to redress such grievances

Even when change is accelerated by the growing amount of information there are no overnight radical changes which make today look completely different from yesterday Therefore the change may be fairly accurately anticipated This means that there is enough time to prepare for it

The important thing is to maintain organizations and institutions capable of effectively and flexibly reacting to such change The freedom to act in the face of change is an indispensable element of the informational society And this is also believed to be one of the means by which to solve some if not all of the problems of the generation gap

It is technological progress that causes rapid change At the same time this progress results in imbalanced development It is also a fact that there is spreading spirit of revolt against technology and civilization In recent years university campuses all over the world have been plagued with unrest The root of the student revolt and their anti social actions seems to lie in anti civilization and anti technology sentiments It is impossible however to improve the present society through anti civilization and anti technology activities Civilization and technology must be considered natural phenomena so long as this part of nature called man exists on earth and simply revolting against or negating civilization and technology will not solve any of man s problems

According to Eugene Rabinowitch what is needed under these conditions is not the objectively impossible retreat from our mechanized automated technological civilization but rapid adaptation of all political and social organization to the requirements of this civilization permitting its intelligent application to serve human needs A way must be found to direct the immense creative and productive capacities of science and technology toward making the earth a satisfactory habitat for the hosts of human beings It is within a highly organized technological society and not on its ruins that mechanisms for the protection of individual freedom for the stimulation of individual creativity and safeguarding individual privacy will have to be found This is not a matter of preference but of inescapable logic of the cultural and social evolution of the species A difficult evolutionary challenge but it can not be avoided The only alternative to meeting it successfully is for Homo sapiens to join the innumerable species discarded in the course of evolution because they were unable to adapt themselves to a changed habitat (Eugene Rabinowitch Bulletin of the Atomic Scientists September 1968 Student Rebellion The Aimless Revolution? ) As Eugene Rabinowitch points out problems cannot be solved by negating civilization and technology

It is said that advanced countries especially the United States have recently begun to give much attention to the need for technology assessment The 1970 s may be considered a decade of technology assessment Yet rather than slowing down the process of technological development it is pushing forward technological development not in fragmentary fields but as a total social system while searching for new means of achieving the optimum in such a total system which will achieve this assessment of technology



## THE CO-EXISTENCE OF PLURAL VALUE-SYSTEMS

The third characteristic of the multi channel society the informational society is its diversity and the co existence of plural value systems Potentially there are as many value systems as there are different faces Actually however such complex value systems do not come to the surface This is because each community is under historical social and economic restrictions But in economically well developed and affluent societies there are far fewer economic restrictions At least in this aspect is there reason for the emergence of many more value systems This sort of diversification is desirable in the sense that expression is given to that which is the essence of human nature

It is said that the world situation today is characterized by military bi polarization obviously means the balance of power between the overwhelming military mights of the United States and the Soviet Union Yet more significant is the political multi polarization taking place within the world stability thus attained In other words diversification is also taking place in the field of international politics

Unlike the period immediately after World War II national behaviors are no longer characterized by rigid conformity to specific relationships of alignment Rather it is now possible for countries to make diverse policy decisions It is now possible for many countries to choose from a wide range of alternatives An increasing number of Western countries oppose American policies and act independently

This sort of change must be considered progress toward the more desirable Nevertheless it is equally true that diversification causes new problems Diversification is obviously in contradiction to social order When every individual or country starts acting strictly in accordance with the self s own system of values it becomes difficult to maintain order in the society or the world It is imperative that the multi channel society solve the problem of how to allow diversification and yet maintain social and world order

There is yet another problem involved in the diversification in that man s desire s keep expanding These desires are for both the rational and the irrational Even if the means of satisfying some desires is enhanced by technological progress that alone will not make it possible to satisfy all desires

Frustration tending to increase with technological progress will also increase There are technical ways of dissolving such frustrations but considerations of the optimum allocation of resources will frequently prevent the practical steps needed to alleviate individual frustrations from being taken promptly The net result is that technological progress increases rather than decreases frustrations The impression may even be given that technological progress is irrelevant to human happiness

The problems of that society capable of embracing such diversity will be solved by the total system approach aiming at the optimum society Needless to say it is important that the total system also incorporate man with all of his diverse and subtle emotions All the systems of our society are in essence man nature machine systems It is extremely important in attaining the optimum

total system that consideration be given to the positions and functions assigned to machines to permit man and nature to perform his role in optimum fashion

In the total system approach it is not enough to incorporate only the rational products of technology Something more something besides technology some thing that transcends technology must also be incorporated in the system It is necessary to devise a total system which can embrace not only the rational but also the irrational This conclusion follows naturally from the present reality in which human aspirations for the irrational grow stronger within the tendency for the rational portion of the society to expand unchecked

Man seeks live worth life Man is not content with simply an affluent liveli hood An affluent society is not necessarily a society that gives a sense of live worth life The more affluent the society becomes the greater man s desire for a sense of live worth life is Thus it becomes important in such a society that the worthwhile life be guaranteed

For example it is important to delegate individuals shares of authority and responsibility befitting their capabilities This implies a step toward the system of participation In parallel with this scheme of participation it becomes neces sary to expand social mobility and the mobility of people across organizational boundaries The need for personnel mobility within business also stems from this It is necessary both to encourage the situation wherein the right man fills the right post and to help increase adaptability by encouraging mobility both vertical and horizontal

## THE STRUCTURALLY ELASTIC SOCIETY

One might call the society capable of doing these things a structurally elastic society This is also related to the multiple structure of society The informational society or the multichannel society is inevitably a society with structural elasticity and it is this which may be cited as the fourth characteristic of the multichannel society Such a society is capable of embracing anything and ensuring fluidity of movement

Naturally institutions undergo constant change in such a society Tradition ally institutions necessarily lag behind the existing society It is in the nature of institutions to offer a framework of order based upon past events Therefore it is of vital importance in the structurally elastic society embracing rapid change that institutions be constantly reviewed and changed

This in turn gives rise to new problems The wide delegation of responsibility and authority the elastic structure of society and the constant institutional modifications are not unrelated to confusion and disorder

Yet it is possible to build a soft society which maintains a degree of order despite its multiple structure and diversity Firstly since all change which takes place there is basically metabolic the countermeasures can also therefore be metabolic Since the change toward the multiplicity of structures and greater diversity is recognized as inevitable it should be possible to prepare and adapt the social institutions to cope with such diversification if the society adopts positive attitude toward change There should also be time enough to prepare

The assumption that such a society will be less efficient must be borne in



mind But efficiency is not as important as is effectiveness The question is whether the society will function effectively or not

In order to be able to embrace diversity and structural plurality the receptacle needs to have a larger capacity This might be called a society of greater redun dancy Society progresses through maximizing the rational content as much as possible but man does not feel that such an approach alone increases his free dom As a result the more the rationalization process progresses the greater is the need in society for niches and breathing space This we call redundancy

It is said that violence will never disappear from the earth This is quite natural since violence is in a sense necessary The need then is not for eliminating violent situations but for making the developing world into a receptacle capable of containing such small violence Such receptacles are necessary not only to the world but to all societies Such societies may be called societies with many niches or crevices or porous societies

Another thing to keep in mind is that no policy can claim to be a permanent of fundamental solution Society constantly changes and the pace of change is being accelerated In such situation there can be no permanent solutions Rather solutions must be worked out as problems come along While this sort of ap proach may appear to be lacking in perspective and stability it nevertheless remains a fact that society goes through constant change and the only valid policy for coping with such constant development is that dynamic stability achieveable only through mobility

## THREE FUNDAMENTAL APPROACHES

In summation of the above the following points might be mentioned as fundamental approaches which need be taken in the total system of the multi channel society One is accurate forecasting of future changes and measures to be taken on the basis of such forecasts Such measures include both technological and institutional solutions Yet such solutions will not be permanent The process of constant renovation and readjustment must go on in pace with the constantly changing society

Secondly it is imperative that there be what one might call a shift in the concept of order This would be a shift in thinking toward recognition of the need for redundancy a shift from the quest for efficiency to the search for effectiveness In traditional Japanese it is the importance of a society allowing space be tween

Thirdly and obviously must be emphasized the need for increased tolerance and adaptability between society and man This means a demand for new education

I should like to add just a few words concerning this new education Education must be life time education In other words the question is how diverse educa tional systems can be incorporated into society Conversely as much of society as possible must be brought into the educational system It is necessary to find a solution to the problem of how to bring society into the educational system

In other words the important question is how to bring education into society and society into education Also solutions must be found to the problems of

how to add the element of play to work and how to introduce educational functions into the individual s free or play time In still other words it is neces sary to create a society in which play study society and education are all fused together

This is the multi channel society and it is in this direction that our society is bound to move in the future

# METHODOLOGICAL APPROACH TO MULTI-CHANNEL SOCIETY

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## CHANGES IN VALUES AND FUNCTIONS IN THE MULTI-CHANNEL SOCIETY

Of the various functions possessed by material goods the most important are naturally the minimum basic functions which satisfy directly the minimum desires directed toward such material goods These minimum basic functions are such as for an automobile for instance to transport people and things to the desired destination as speedily as possible Even if however such basic desires have been fully satisfied people are not necessarily satisfied The desire itself will become more sophisticated seeking improved performance easier handling more compact design instant availability lower cost and numerous other improvements Further men want more fashionable design more decora tive appearance accessories the psychological satisfaction deriving from the social prestige of owning luxury goods and other things that will satisfy desires on a higher plane

The growing sophistication of desires and the corresponding sophistication of the functions of goods were often criticized as extravagance or waste in that industrial society in which it has become possible for a number of material goods to fulfill their basic functions In the next stage that is in the post industrial society the fulfilment of the highly selective aspirations of the greatest majority of society s constituent members must be considered one of the important objectives positively contributing to the welfare of the community It is therefore necessary that the maximum range of freedom of selection be provided for social functions

Furthermore proportionate to the diversification of values and aspirations it will become necessary to provide greater diversity in the choice of channels through which to fulfill such values and aspirations as well as to accelerate the pace of change in the channels themselves A study on the kind of changes that functions undergo in a given space of time reveals the fact that the selective function increases in importance relative to the various functions possessed by

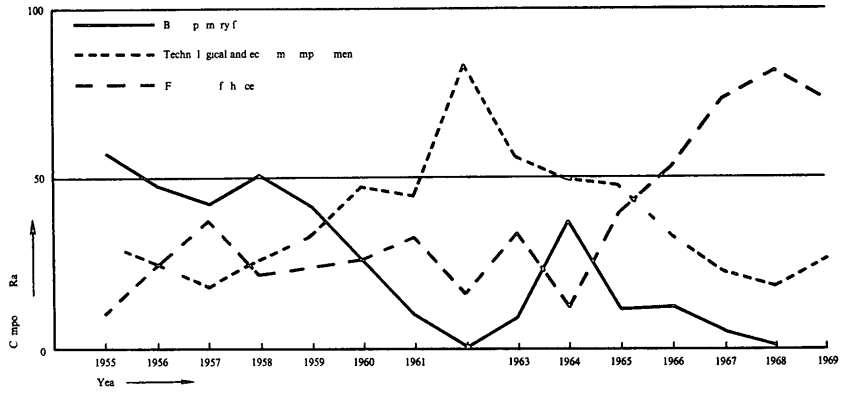



Diagram 1 (A)
Changes in functions of black and white television receivers

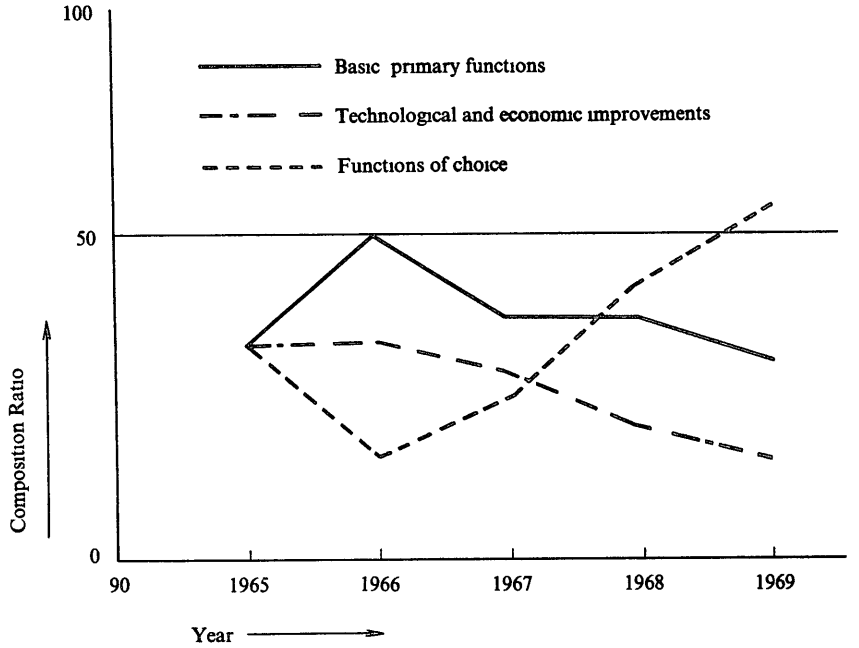



Diagram 1 (B)
Changes in functions of color television receivers

goods and services (For example the availability of a wide range of selection is emphasized as a sales point in the advertisements of merchandise )

Diagram 1 shows the results of a survey of historical changes in the catch



phrases in the advertisements of black and white television receivers carried by the Asahi Shimbun (Newspaper) from 1955 through 1969 classified into the three categories of

A Basic functions (image sound programs etc )
B Technological and economic improvements (automation compactness reliability lower cost etc ) and
C More sophisticated selective function (design model name prizes, corporate image etc )

The results of this analysis of changes in the functions as seen through the advertisements indicate as shown in Diagram 1 at least that the advertisements of basic or primary functions was given the greatest emphasis for some time after the introduction of the new device of the television set that secondary functions related to technological and economic improvements began to receive emphasis from 1959 and that more sophisticated functions of choice grew to large proportions from around 1965 although the changes in fashion and the impact of social events (such as the Olympic Games Apollo II etc ) also need to be taken into account in the evaluation Such change tendency corresponds to the saturation ratio of television receivers as well as to the life cycle curve The same general observation may be made for various other goods

## ADJUSTMENT BETWEEN THE SOCIAL FUNCTIONS AND VARIOUS ASPIRATIONS IN THE MULTI-CHANNEL SOCIETY

As seen in above example there are a great variety of functions related to the goods services and information supplied to society

As the desires of the constituent members of society grow diverse and go through rapid changes both the social functions for fulfilling such desires and the social structure supporting the supply of functions tend to become fixed and immobile There is therefore an ever larger need to plan on the basis of an overall analysis of the social system as well as an adequate estimate of its future changes if the functions are to be well adjusted to the desires

Such planning however must not be rigid uniform control Rather, it is desirable that it take the two step approach shown below

i) For the hardware sub systems geared to the production of goods transportation and traffic network medical care prevention of environmental hazards (pollution) etc necessary to secure the civil minimum of fulfilling the basic primary desires efforts are to be exerted to establish rational system planning based on the cost effectiveness ratio through P P B S and other means
ii) In order to fulfill the values and desires which will grow increasingly diverse it is necessary to provide for various corresponding social functions which are sufficiently diverse and flexible as well as to diversify the channels relating the desires to their corresponding social functions

In so doing although it is necessary to make some adjustments in order to alleviate the worsening of conflicts among diverse desires it is crucial that the

creation of pressures forcing the acceptance of any specific value outlook or excessively aggressive planning restricting the choice of channels be avoided since the overriding objective is to raise the level of freedom of choice for the constituent members of society

## PREDICTION OF HISTORICAL (TEMPORAL) CHANGES IN VALUES AND DESIRES

While it is possible to measure the diversity of values and desires of the members of society through various means including questionnaires content analyses and so forth it is very important to estimate the course of their future changes The value outlooks and the desires are determined by a number of factors including the social traditions social norms local environments individual personalities and age Among the more important factors to be considered are the individual s stage of intellectual and physical maturity the sort of social environment in which he is placed and the kinds of events he has experienced These factors offer an effective means of understanding particularly the changes in value outlooks from generation to generation Also if it is shown that the value outlooks and desires of an age group or contemporary generation are closely related to the social environment or events a certain amount of prediction will be possible regarding the future changes in value outlook and the desires of any given generation

It may be worthwhile in accordance with this line of thinking to prepare a chronological table showing at a glance at what age each generation experienced the various changes in social environment (quantitative changes) and social events (qualitative changes)

In this Table the horizontal axis represents time and shows chronologically the changes in the social environment while the vertical axis represents the age of the members of society and the figures in the matrix correspond to the age of each particular generation at particular points in time

As a result the same set of physiological and psychological stages are represented in the matrix as a band joining the two axes at approximately the same angles

At the moment the preparation of the chronological table incorporating various changes in social environment and social events as well as the value outlooks of various generations and the characteristics of their behavior patterns is still in progress and we are unable to give an adequate analysis of the results However partial results of this work are shown in Diagram 2

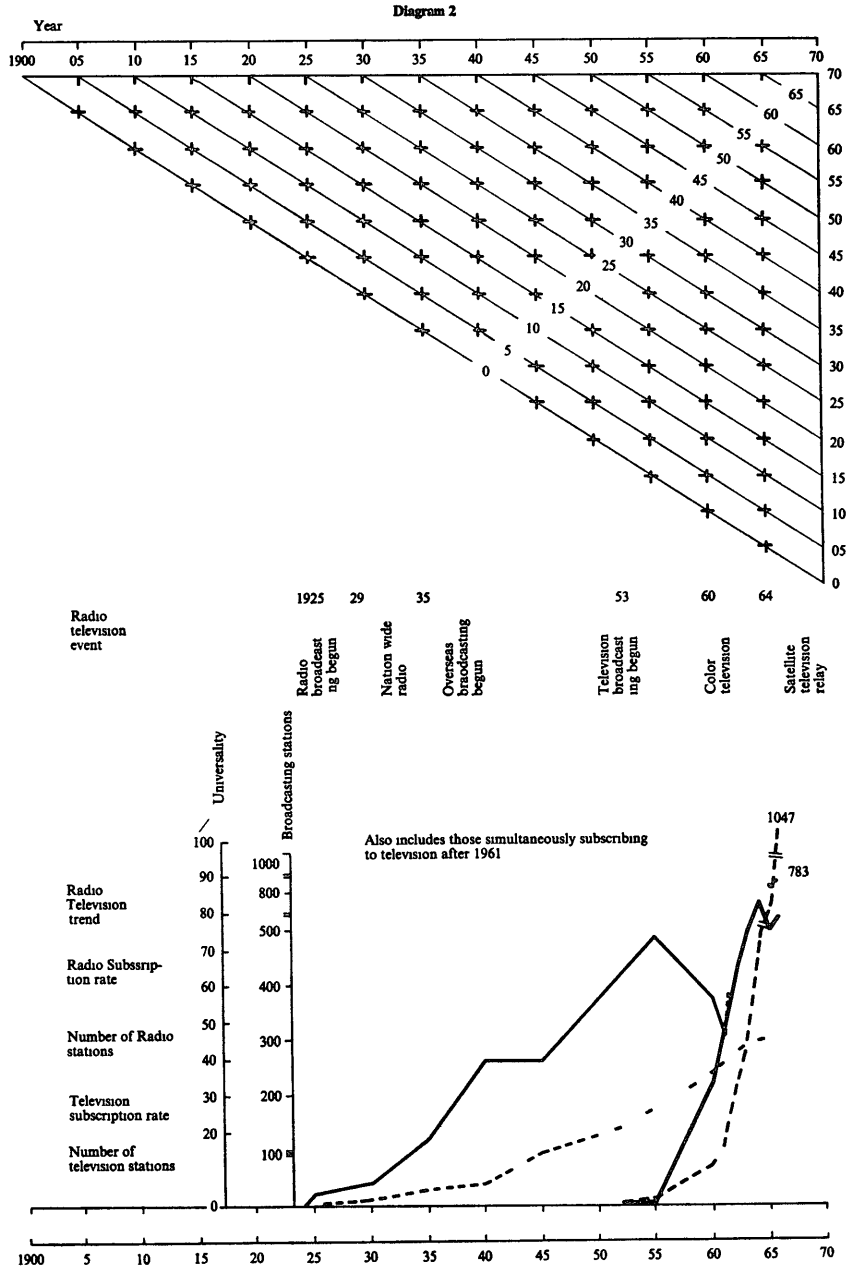
This method involves a number of problems yet to be clarified including

i) To what extent do the social environment and events influence the changes in value outlook and to what extent do the relatively unchanging factors such as hereditary tradition and climate act as stabilizing forces?

ii) Because not only individual events at specific points in time but also the totality of the diverse experiences accumulated over long periods of time contribute to changes in the value outlook it is vital to clarify the interaction of a number of factors even when consideration is restricted to the factors of social environment and events



Diagram 2



iii) How does a given change in the social environment affect different generations or age groups?

Nevertheless we feel that it will become possible as studies on those points mentioned above progress to predict through analysis of the impact of changes in the major media of communication (for example printed material s having stimulated theoretical thinking and television s having stimulated sensory think ing) to a certain extent the changes in value outlooks and patterns of thought brought about by the popular use of computers in the near future

## ADJUSTMENT OF COMMUNICATION CHANNELS AMONG THE MEMBERS OF SOCIETY

As the value outlook and the desires of the individuals as well as of various social groups comprising the society become more diverse and as the character and functional changes of individual groups are accelerated the need for the systems approach will grow increasingly great if the interaction between them is to be adjusted If we are to define the entirety of interactions (in the broad sense of the term) of individuals and groups as communication it becomes necessary to study the diverse aspects of such communication including

i) The elements of the communication system—for example, individuals and various social groups as senders and receivers of communication
ii) The availabilities and types of communication routes—whether or not there exist routes of communication between elements whether such routes are unilateral or bilateral which element has the decision making power whether such routes are direct routes or indirect routes etc (Table 1)

**Table 1 Type of Communication**

| Types | The illustration | Basis of classification: Decision maker | Basis of classification: Direction of Action | Examples |
|---|---|---|---|---|
| A a | | Both | Bi lateral | Request consent |
| B b | | Sender | Bi lateral | Demand compliance |
| C c | | Receiver | Bi lateral | Application Approved |
| D | | Sender | Unilateral | Restriction |
| E | | Receiver | Unilateral | Unilateral effort (Sales advertisement) |

Central (decision making) element
Element not holding decision making power
Direction of communication



iii) The content of flow via such routes—information material goods money deeds social norms etc and
iv) The kinds and functions of channels of communication—for instance the means of communication of information the means of transportation for moving material goods etc

In this study we selected as representative elements having social functions the following sixteen elements

Individual persons self employed professionals personal service trades leisure industries hospitals educational institutions research institutes the press the advertising industry wholesale and retail trade the transportation industry manufacturing industries financial organs courts of law legislatures and central and local government bodies

The communication between and among them is shown in matrix form and the characteristics of each matrix element is studied (Table 2)

Against this sort of communication matrix analysis is made on the points mentioned below

i) Desire for communication between elements
ii) Availability and characteristics (quality) of channels of communication
iii) Quality and quantity of flow and stock via these channels—human beings material goods information energy services social norms etc
iv) Kinds functions and capacities of media constituting the channels
v) Matching of diverse desires and channels and adjustment of functions and
vi) Prediction of future changes for each of the above items

Moreover on the basis of the results of the above analysis it will be practicable to some extent to provide rational systems for the channels connecting the basic (non selective) desires and the basic functions as well as to raise the possibilities of choice of other channels

In practical terms this method of preparing the matrix involving individuals and many kinds of social groups to arrive at a chart showing the many modes of communication is a very complex exercise Diagram 3 and Table 3 show simply as an example of a sub system how the communication network changes when a monitoring organ such as shown by the dotted line is introduced into the political communication system connecting the government agencies and the people

## GROUPING OF SOCIAL FUNCTIONS AND DESIRES BY BEHAVIORAL ANALYSIS

In order to effect adjustments between the diversified desires and the social functions required to satisfy such desires it first becomes necessary to carry out functions But the conventional method of for example classifying the social adequate classification and structuralization of each of the desires and social functions from the viewpoint of industrial classification into the primary secondary and tertiary industries is hardly appropriate to the purpose of classify ing the various functions of future society A more appropriate approach would be

**Table 2 Interaction matrix examples**

| By types | Individual | Self-employed | Personal service | Leisure | Hospital | Education | Research | Press | Advertising | Wholesale and retail | Transportation | Manufacturing | Financial | Legal | Legislative | Government |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Individual | | A | A | A | A | | | b<br>c | | A | A | | A | B | (c) | E(c) |
| Self employed | a | | | a | | | a | a | a | a | | a | | B | a | (c) |
| Personal service | a | | | | a | a | a | a | a<br>A | a<br>A | | | a<br>A | B | | (a)(c) |
| Leisure | a | A | | | | a | | A | A | A | A | A | A | B | | |
| Hospital | a | | A | | | a | A | | A | A | | | A | B | | a(c) |
| Education | B<br>c | | A | A | A | | | A | A | A | A | | A | | | (c) |
| Research | | A | A | | a | | | a<br>A | | A<br>a | a | a<br>A | a<br>A | B | a | a(c) |
| Press | D<br>E | A | A | a<br>E | | a<br>E | A<br>a<br>E | | a<br>A | a<br>(A) | a | a<br>A | a<br>A | B | | a(c) |
| Advertising | E | A | A<br>a | | | | | A<br>a | | a<br>(A) | a | a<br>A | A<br>a | | | a(c) |
| Wholesale and retail | a<br>E | A | A<br>a<br>E | a<br>E | a<br>E | a<br>E | a<br>A<br>(E) | A<br>(a) | A<br>(a)<br>E | | A<br>(a) | A<br>(a) | A<br>(a) | B | | a(c) |
| Transportation | a | | | a | | a | A | A | A | a<br>(A) | | a<br>A | A | B | | (c) |
| Manufacturing | | A | | a<br>E | | a | A<br>a<br>(E) | | A | a<br>(A)<br>E | A<br>a<br>E | | A | B | | (c) |
| Financial | a | | A<br>a | a | a | (a) | A<br>a | A<br>a | A<br>a | a<br>(A) | a | a | | | | a(c) |
| Legal | b | b | | b | b | | b | b | | b | b | b | | | D | |
| Legislative | (c) | A | | | | | A | | | | | | | | | (c)<br>D |
| Government | D | (c)<br>D | A(c)<br>D | (c)<br>D | A(c)<br>D | (c)<br>D | A(c)<br>D | A(c)<br>D | A(c)<br>D | (A)(c)<br>D | (c)<br>D | (c)<br>D | A(c)<br>D | D | (c) | |



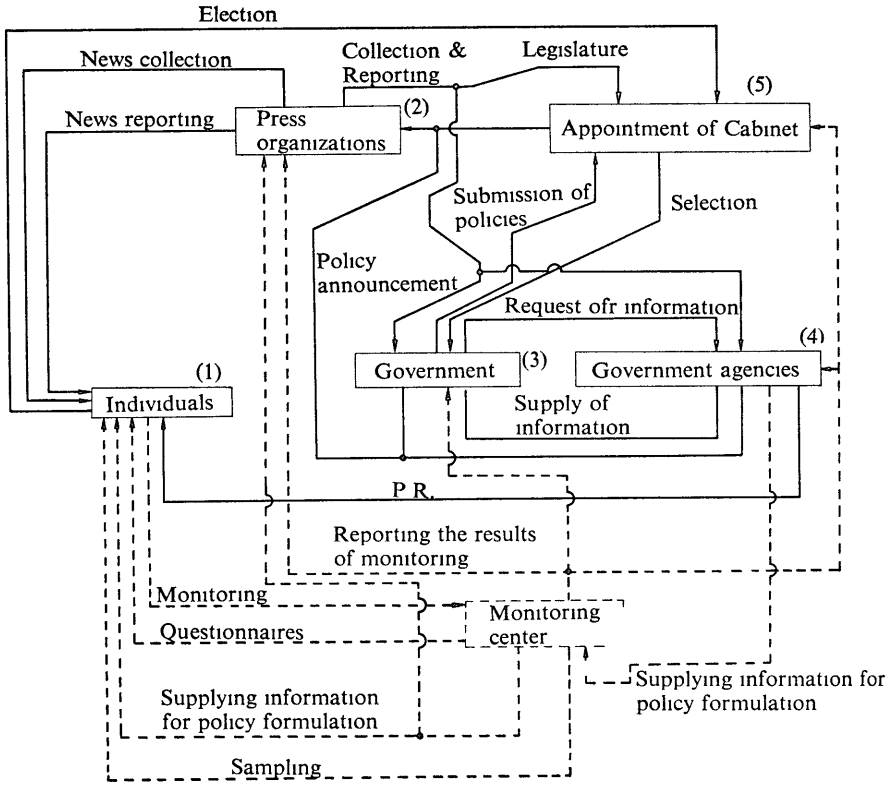
**Table 3 Policy dissemination and participation communication matrix**

| Objects | Individuals (1) | Press organizations (2) | Government (Cabinet) (3) | Government agencies (4) | Legislature (5) | Monitoring center (8) |
|---|---|---|---|---|---|---|
| Individuals (1) | C11 | (Visual) letter suggestion C12 | C13 | (P R audio visual) C14 | Voting audience C15 | Supply of information questionnaire C18 |
| Press organizations (2) | Reporting Information collection C21 | C22 | Information collection Reporting C23 | Information collection Reporting C24 | Information collection Reporting C25 | Supply of information C28 |
| Government (cabinet) 1 (3) | C31 | Policy announcement C32 | C33 | Demand for information C34 | Submission of policies C35 | C38 |
| Government agencies (4) | P R C41 | Policy announcement C42 | Submission of information C43 | C44 | Submission of information C45 | Submission of information C48 |
| Legislature (5) | Election campaign C51 | Policy announcement C52 | Appointment C53 | Request for information C54 | C55 | C58 |
| Monitoring center (8) | Monitoring C81 | Reporting on results C82 | Reporting on results C83 | Reporting on results C84 | Reporting on results C85 | C88 |

(3) Monitoring System

i) To extract the elements related to both desires and social functions through analysing in concrete terms the activities of social daily life and clarifying what desires are satisfied by such activities and what social functions make them possible

ii) To express in the matrix of inter relationship (1 0) the interactions of




In order to avoid complicating the Diagram press collection and reporting vis – vis the government government organs and legislature have been shown as a single line

Diagram 3 Monitoring System

elements for each of the combinations of actions and social functions and actions and desires

iii) Using electronic computers to group the desires showing a pattern of putting the combinations closest to similar actions into single groups and

iv) To study the adjustment capabilities between the desires thus grouped together and the social functions

As a result of such a study one may consider those elements which are common to a great number of individual persons and also show the strong connection between a great number of actions and elements as the ones most strongly possessed of basic or primary desires and basic or primary functions

In accordance with the method described in the foregoing an attempt was made

i) To make an analysis of acts in daily life excluding from social life those connected with work or rendered during the working hours on the basis of the results of NHK s study of how time is spent

ii) To extract representative social functions using as reference the occupation classification tables

iii) To extract representative words expressing desires from the classified vocabulary tables (National Institute of the Japanese Language)

iv) To prepare a matrix with (0 1) indications of the inter relationship of functions and acts and desires and acts from i) and ii) and i) and iii) and

v) To group desires and functions most frequently related to the identical acts using the grouping method

The results of the above attempt are shown in Table 4

For the time being, the problems remaining to be solved include

i) That the (0 1) expression of the inter relationship between the matrix elements tends to oversimplify their relationship and

ii) That it is difficult considering the capacity of electronic computers to have more than 12 desire and function elements

Despite these problems this method may be considered to be a fairly universal meaningful method for the purpose of grouping with a minimum of subjective judgement



## CHANGES IN SOCIAL FUNCTIONS AND PLANNING THROUGH RESOURCE DISTRIBUTION

One concrete means of making adjustments between desires and social functions within a social system would be to change the character and inter relationship of desires and functions through effecting the optimum distribution of resources (labor capital educational expenditures research and development expenditures etc ) against individual social functions

For the fulfilment of desires on the part of any given individual or social group it is preferable to maximize the possibility of free choice as long as it is not very harmful to other individual persons or social groups The adjustment of social systems therefore will be done primarily through changes in communication channels and through changes in social functions Moreover if it is preferable to bring about social progress through free competition it is more appropriate to adjust the social functions not by relying on direct intervention of state power but by emphasizing indirect means of altering the quality and quantity of the resources to be distributed and assigned to individual functions

In order to do this it would become necessary to perform the series of acts shown in the following

i) To assess the resource amounts to be assigned to individual social functions (input)

| | 1 Service[5] | 2 Textiles and clothing | 3 Foodstuffs | 4 Furniture | 5 Electrical | 6 Miscellaneous[8] | 7 Customer service[9] | 8 Manufacturing [0] | 9 Civil engineering | 10 Publishing [2] | 11 Culture | 12 Leisure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sleeping | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Eating | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Washing up | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Toilet | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Doing hair | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| Bathing | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| Attending class | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| Experiment practice | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| Library use | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Club activities | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| Tutoring | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Communications | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Preparing food | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| Shopping | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| Washing and cleaning | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Heating | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Child care | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| Nursing | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Reception | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Making and mending clothes | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| Neighborhood youth housewife and consumer groups | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| P T A | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| Weddings and funerals | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Religion | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| Elections | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Going out | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Resting | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Theater | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sports | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| Study and practice | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| Handicrafts | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| Walks | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Fishing gardening and pets | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Automobiles | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| Children s play | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Travel | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| Commuting to and from work | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Newspapers magazines and books | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Radio and television | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Games | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |

**Table 4 Inter relationships for life behaviours and services**

Note 1–14 see page 316



ii) To assess the desire amounts which be fulfilled by these social functions (output)

iii) To perform cost/effectiveness analysis to see whether the resources are being fully effectively utilized on the functions particularly for those functions that are to be considered basic and primary and

iv) To make predictions on i) through iii) and decide on concrete courses of action

In the resource distribution of the multi channel society the distribution of knowledge and information will gain importance over the distribution of re sources conventionally centered around capital and labor Also it is expected that the development and distribution of specialized intellectual workers and the relevant training and research and development activities will play a greater role If we restrict our attention now to the question of resource distribution of manpower we may divide the total labor population in accordance to the scheme of work and by industrial classification into those engaged in the produc tion of hardware and those engaged in the production of knowledge and service (software) and further divide them into those engaged in physical labor manual labor or simple intellectual labor and those engaged in the intellectual labor requiring fairly high professional capabilities The results of such classification is the manpower distribution shown in the matrix of Table 5

For instance looking at the OECD countries we obtain the results as shown in Table 6 and Diagram 4 and each value in the matrix is shown to be fairly closely inter related to the per capita GNP Moreover the proportions of various elements show diverse patterns which correspond to the individual characteristics

**Table 5 Manpower distribution**

| Object of work / Kind of Social activities | H hardware (production of goods) | S software (production of services and knowledge) |
|---|---|---|
| Physical labor and Simple intellectual labor | H P | S P |
| Intellectual or Professional Labor | H I | S I |

**Table 6 Table of Correlation Indicators**

| | HI | SP | JI | SI | I | S |
|---|---|---|---|---|---|---|
| GNP base | | | | | | |
| Same year | −0 7671 | 0 5363 | 0 7603 | 0 7751 | 0 8500 | 0 5294 |
| 2 yrs later | −0 7835 | 0 5836 | 0 8190 | 0 8197 | 0 8822 | 0 60899 |
| Index of Information orientation | −0 8266 | 0 6927 | 0 7757 | 0 8272 | 0 8629 | 0 7808 |

Another exercise in measuring the progress of the information orientation of society involves the following six items

1 Newspaper circulation (per thousand persons)
2 Number of television receivers (per thousand persons)
3 Number of telephone receivers (per thousand persons)
4 Copies of books published (per thousand persons)
5 Number of students in colleges and universities (per thousand persons)
6 Number of students in middle schools high schools and occupational and trade schools (per thousand persons)

On the above six items the 18 nation average is set at 100 and each piece of data is converted into an index Next a simple average of the six items is taken which is then converted into an information index As a result of this exercise it is found that there is a fairly high correlationship between that index and each matrix element (Diagram 6)

When we analyse the temporal (time basis) data for these elements it is possible to a fairly great extent to predict their future trends (Diagram 7)

In practice this sort of matrix needs to be analysed in further detail Table 7 shows an attempt at their structuralisation

We have reviewed in the preceding chapters several approaches to predicting and planning for social systems Yet there are many problems left for further study including

i) Methods of adjusting between qualitatively diverse values and desires individual differentials regional differentials the generation discontinuities etc
ii) The question of shifting from qualitative treatment to more quantitative treatment particularly the question of developing the relevant social indicators and
iii) The prediction of and the formulation of measures with which to cope with non continuous changes which cannot be treated by projection from the temporal (time basis historical) data accumulated from the past

## ACKNOWLEDGEMENT

A part of this research was carried out by in addition to the authors Masakuni Koizumi and Fumio Kodama and the other members of the Industrial Planning Research Office of the Social Engineering Department of the Tokyo Institute of Technology) To them as well as to Associate Professor Yoshio Hara of the Tokyo Institute of Technology Executive Director Yoshikai Katsuyoshi of the Japan Techno Economics Society and the many other people who were so generous with their cooperation we express our heartfelt gratitude

Table 4 (p 314) Note 1–14

1 (including going to doctor)
2 (reclining smoking drinking tea and talking)
3 (plays performance exhibition and concert)
4 (spectator and participation gymnastics bowling and golf)



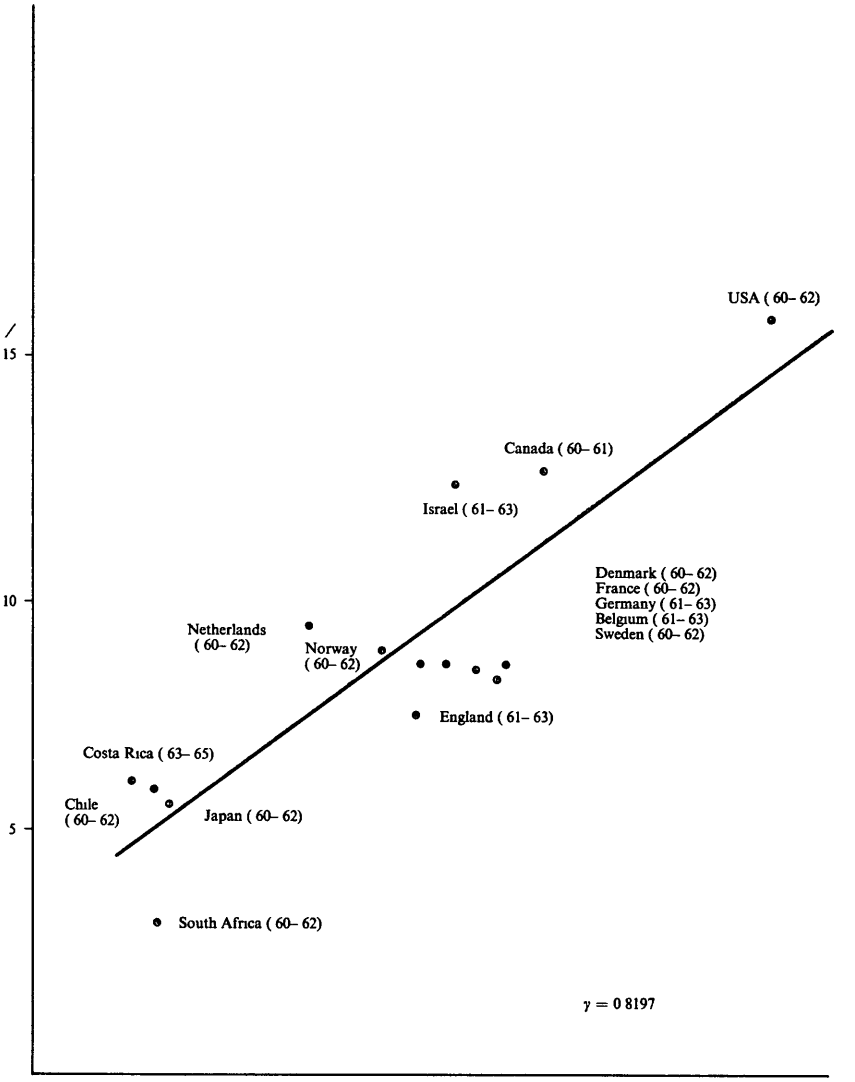



Diagram 4 SI Relationship between the occupational composition (that year) and the per capita GNP (two years later)

of the countries (Diagram 5) Further their coefficients are higher when compared with the GNP of 2 years later than with that of the same year It is also significant that the S I show higher correlation than three others

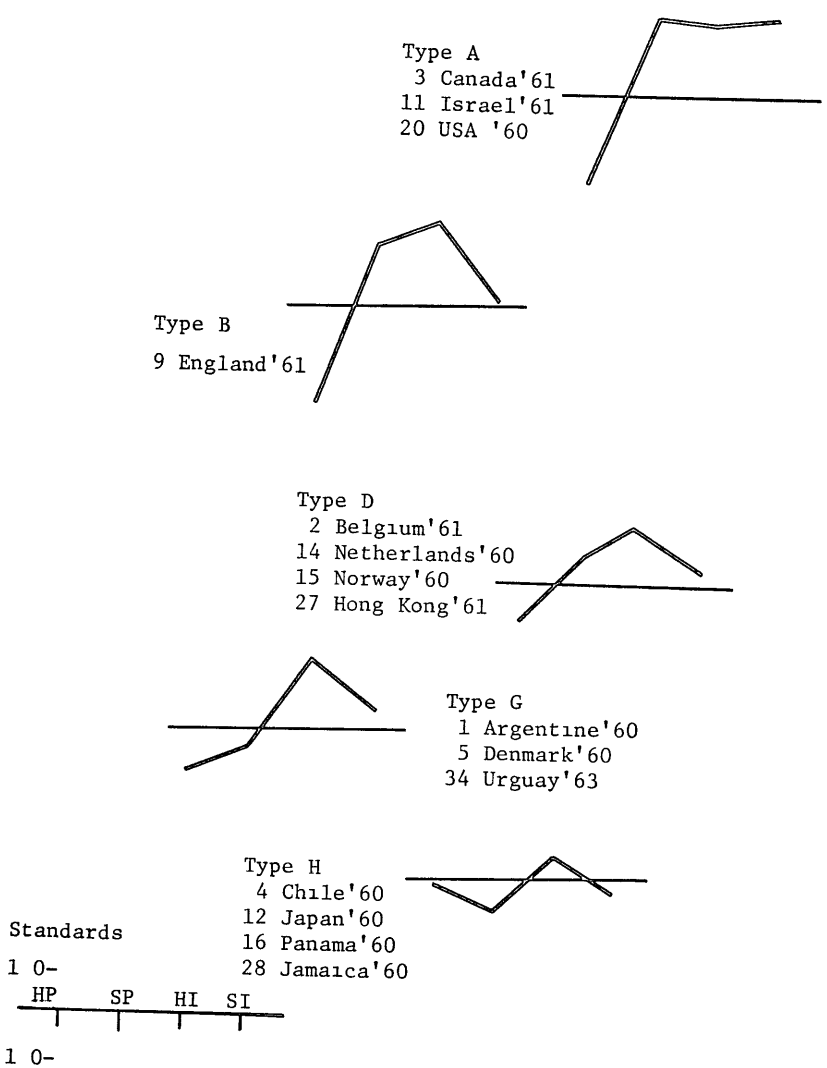



Diagram 5 Quartiles

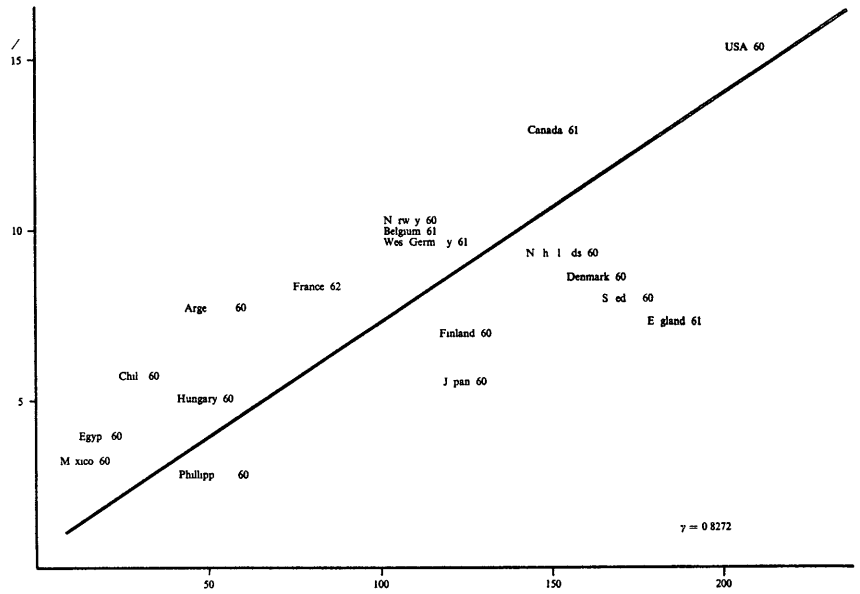



Diagram 6 Correlation of Occupational Composition and Indice of Information orientation

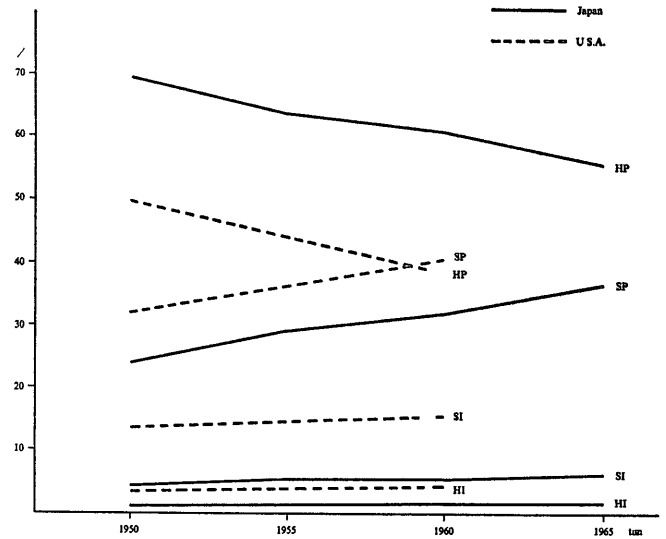



Diagram 7 4 Matrices in Japan and U S A Temporal Changes in Future



**Table 7 Temporal changes in the matrices of employment classification**

Unit $\frac{\text{Employed population}}{\text{Total population}} \times 100$

| Operation \ Subject | Hardware: Material | Hardware: Hard sub system | Software: Money | Software: Health welfare | Software: information & imagination | Software: Culture value | Software: Other | Software: Soft sub system | Total system | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Collection of raw material — Harvesting | 32 229 | | 0 913 | | 0 143 | 0 420 | | | | 33 705 |
| | 25 892 | N A | 1 586 | N A | 0 178 | 0 445 | N A | N A | N A | 28 101 |
| | 21 683 | | 2 002 | | 0 204 | 0 429 | | | | 24 318 |
| | 16 211 | | 2 419 | | 0 240 | 0 473 | | | | 19 343 |
| Collection of raw material — Cultivation | 439 497 | | | 2 400 | 0 055 | 0 206 | | | | 442 158 |
| | 379 363 | N A | N A | 3 315 | 0 178 | 0 438 | N A | N A | N A | 383 294 |
| | 304 881 | | | 4 521 | 0 204 | 0 415 | | | | 310 021 |
| | 252 371 | | | 5 218 | 0 240 | 0 476 | | | | 258 305 |
| Processing | 132 646 | | | 0 730 | 5 162 | 0 604 | 10 378 | | | 149 520 |
| | 128 708 | N A | N A | 0 917 | 7 691 | 0 752 | 22 954 | N A | N A | 161 022 |
| | 130 093 | | | 0 806 | 11 398 | 0 204 | 19 694 | | | 162 195 |
| | 156 155 | | | 0 828 | 14 447 | 2 160 | 43 402 | | | 216 992 |
| Production (systems) | 57 302 | | | 4 635 | 0 549 | N A | | | | 62 486 |
| | 51 355 | N A | N A | 4 322 | 1 200 | 0 422 | N A | N A | N A | 57 299 |
| | 76 990 | | | 6 337 | N A | 1 134 | | | | 84 461 |
| | 81 110 | | | 4 439 | 1 428 | N A | | | | 86 977 |
| Maintenance | 6 335 | 3 915 | 18 499 | 3 049 | 55 487 | | 16 110 | 0 354 | 5 201 | 109 030 |
| | 9 132 | 7 726 | 22 602 | 3 646 | 54 804 | N A | 10 315 | 0 286 | 3 219 | 111 732 |
| | 21 086 | 8 287 | 28 113 | 2 544 | 69 912 | | 10 044 | 0 470 | 3 069 | 143 525 |
| | 19 714 | 9 482 | 36 928 | 6 692 | 99 393 | | 9 258 | 0 605 | 3 615 | 185 687 |
| Movement — Shipping | 58 418 | | | | 6 952 | 4 344 | | | | 69 714 |
| | 71 545 | N A | N A | N A | 7 820 | 4 578 | N A | N A | N A | 83 943 |
| | 80 040 | | | | 10 120 | 4 513 | | | | 94 673 |
| | 96 502 | | | | 12 077 | 5 147 | | | | 113 726 |
| Movement — Distribution | 82 205 | | 1 011 | | 6 948 | 7 320 | 5 770 | | | 103 254 |
| | 106 038 | N A | 2 253 | N A | 6 345 | 7 525 | 17 515 | N A | N A | 139 676 |
| | 103 196 | | 2 831 | | 6 661 | 7 056 | 27 865 | | | 147 609 |
| | 122 997 | | 4 328 | | 8 228 | 7 623 | 18 158 | | | 161 334 |
| Design | 8 131 | | | | 0 659 | 0 120 | | | | 8 910 |
| | 8 832 | N A | N A | N A | 2 125 | 0 150 | N A | N A | N A | 11 107 |
| | 7 631 | | | | 1 060 | 0 515 | | | | 9 206 |
| | 9 174 | | | | N A | 0 206 | | | | 9 380 |
| Control | | | 0 133 | | | | 0 946 | 18 630 | | 19 709 |
| | N A | N A | 0 263 | N A | N A | N A | 2 121 | 21 415 | N A | 23 799 |
| | | | 0 294 | | | | 1 690 | 22 499 | | 24 483 |
| | | | 0 379 | | | | 1 801 | 31 289 | | 33 469 |
| Total | 816 763 | 3 995 | 20 556 | 10 814 | 75 955 | 13 014 | 33 204 | 18 984 | 5 201 | 1000 0 |
| | 780 868 | 7 726 | 26 704 | 12 200 | 80 301 | 14 310 | 52 905 | 21 701 | 3 219 | 1000 0 |
| | 745 600 | 8 287 | 33 240 | 14 208 | 99 559 | 14 266 | 59 293 | 22 969 | 3 069 | 1000 0 |
| | 754 234 | 9 482 | 44 054 | 17 177 | 136 053 | 16 085 | 72 619 | 31 894 | 3 615 | 1000 0 |

* NA indicates the absence of any appropriate employment classification
* Figure for the various elements are in descending order those for 1950 1955 1960 and 1965

5 Medical insurance department store press financial transportation and government bodies
6 Furniture industrial arts valuables accessories and office supplies
7 Electricity gas water and fuels
8 Daily necessities sundry goods leather goods rubber goods ceramics and stone ware
9 Restaurants inns barber shops public baths laundries sanitation waste disposal assessment storage and pawn shops
10 Machinery industries parts metal industries metal products chemical industries and chemical products
11 Construction landscaping maring industries fishing equipment and racing
12 Printing photography books and publishing
13 Cultural facilities private schools religion ceremonials and group facilities
14 Entertainment and leisure

# AN INTERFACE BETWEEN TECHNOLOGY AND SOCIETY

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## VALUES AND TECHNOLOGIES

Plural value systems co exist in the multi channel society In a society governed by a single value system the technological system required by the society—the group of technologies serving the common purpose—is structurally simple Consequently it is relatively easy to evaluate the individual technologies contributing to system from the viewpoint of their usefulness to society and thus to assign development priorities to the individual technologies

In a society where plural value systems co exist difficulties are encountered in evaluating the usefulness of various technologies This is because in such a society a great variety of technological systems exist in complex stratification corresponding to the equally complex whole of the value systems

The multi channel society for example places considerable emphasis on the new value of safety in addition to the efficiency which was the predominant value in the conventional society while against the conventional value of growth there is a new awareness of stability or destruction as part of the tendency toward such plural value systems It has now become necessary to give substance to each of such values as efficiency safety growth stability and destruction as effectively and as harmoniously as possible

In the modern society the realization of such values is largely dependent upon the tools produced by the society its various systems devices and instruments In other words these tools contribute greatly to the values and the technologies which serve as the foundation for the development and improvement of the tools playing a significant role in the actualization of those values It is here that can be seen the strong ties between the values and the technologies which are the means of their achievement

As specific examples mention may here be made of the accident prevention technologies disaster prevention technologies medical technologies health and hygiene technologies and other technologies useful to achieving safety Each

of these could be considered a complete technological system incorporating such individual techniques as collision prevention devices earthquake prediction devices artificial human organs etc

In this way a great number of technologies serve each value Again each individual technology is relevant to a great many values In this situation however technologies do not necessarily bring about the desired results and a device useful to one value is sometime harmful to another value

As seen above a great variety of technologies corresponding to an equally great number of co existing values are interlocked in the most complex manner in the multi channel society This makes it difficult to assess how necessary or useful each individual technology is to the society

Nevertheless it is expected that the role of technology in the general development of society will grow larger and there is no doubt that the development of technologies will be an important factor in the development of the multi channel society The planned development of technology is particularly indispensable for the realization of plural values in an effectively harmonious manner To this end it is impossible to over emphasize the importance of correctly assessing the great number of technologies and relating them to the values One of the major problems to be faced therefore is that of assessing the relations among the great numbers of plural values and technologies in their matrix like combinations

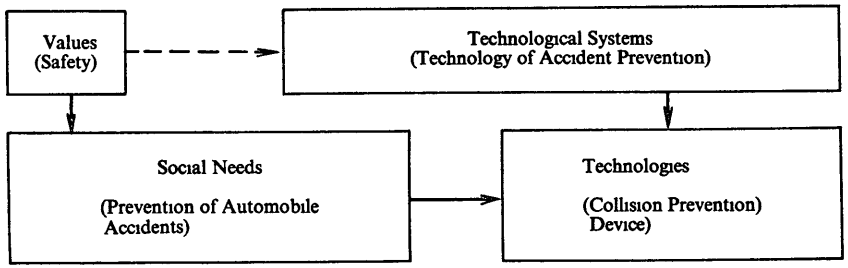
**Relation Through Needs** While it is generally considered proper to assess individual technologies on the basis of values it is difficult to relate individual technologies to values in a clear cut manner

It is considered more practical to combine technologies and values through needs

One strong force motivating the development of individual technologies is the so called social needs Social needs serve as major motivations to trigger technological development Therefore there is a strong relation or clear correspondence between technologies and social needs

On the other hand it may also be said that values appear as social needs in society Conversely social needs contain in themselves single or plural values Therefore correspondence between values and needs is possible and one may

Diagram I Values Needs Technologies






consider the problem of the correspondence between values and technologies through the intermediary of needs

The relationship between values needs and technologies may be shown schematically as in Diagram I

## RELATION OF VALUES AND NEEDS

The values being the most essential component of human desires social needs may be considered the concrete expression of such essential aspirations in the actual society Therefore it is possible to deduce the corresponding social needs from the values and to relate values to needs through adapting abstractly expressed values to concrete social situations

The best approach for obtaining this relatedness of values and needs in practical terms would be to enumerate the social needs in each social sector in as wide ranging and comprehensive a manner as possible arrange them systematically list the values to be achieved by individual needs and then rearrange them on the basis of values In short the appropriate approach would be to go from needs to values

More concretely it is possible to divide needs into the major categories of public (individual or private) and industrial needs and then sub divide each of these into such finer divisions as transportation telecommunication education leisure research and development etc It is then possible to enumerate concrete needs for each of these finer divisions

It is possible to clarify a great variety of needs through this method of dividing social needs vertically and rearranging them

Each of the individual needs thus obtained is for the realization of one or more values The needs in any given field will contain a mixture of diverse values Concerning housing for example the value of comfort is materialized through the functional need for air conditioning convenience through household automation and beauty through tasteful interior decoration

The same diversity of values is also present in such other fields as transportation education and leisure Since values concern the essential aspirations of man and are diverse each sector contains a plurality of values and it is therefore possible to relate horizontally on the value axis various desires appearing as needs in each sector

In this manner extracting values from social needs and rearranging them on the value axis it is possible to relate values and needs What sort of values will exist in future? How will they correlate with each other in this value needs structure? What sorts of needs will grow correspondingly larger? Answers forecast to these questions are important clues to assessing the future state of technology

It is extremely important in attempting any long range and fundamental prediction of the future to understand the various future changes in these values At the same time this is an extremely difficult task and there is neither an established method nor a reliable set of information The present approach while somewhat lacking in thoroughness of technique is to attempt first to assess the needs and then to relate them to technologies

## ASSESSMENT OF TECHNOLOGIES BASED ON SOCIAL NEEDS

The possibilities of correlating values to technologies using needs as the medium and of assessing technologies on the basis of values were suggested in Section I and it was also shown that it is necessary in the latter half of the process to assess technologies on the basis of social needs

The Nomura Research Institute of Technology and Economics has been conducting a detailed analytical survey on this question for the Nomura Securities Co Ltd and as this survey is believed to be one effective approach to assessing technology I will briefly outline their activities with the main emphasis on analysis techniques

**Usefulness of technology** The object of the survey is to clarify the relationship between technology and social needs through the concept of usefulness and to assess technologies by expressing these relations in quantitative terms

The usefulness of any given technology means briefly correctly assessing the relation of technology and society and measuring how that technology serves society and how strongly society needs it For the purpose of giving it quantitative expression the technology s degree of usefulness—its utility rating—may be defined through the following

(Technology s utility rating) = (Magnitude of social need) × (Degree of technology s contribution to the need)

This definition is significant in considering the usefulness of technology through two separate factors assessing the intensity of those factors and then computing the technology s utility rating

The first essential factor is the need In order for a technology to be useful to the society there must be a clear need in the society for that technology It is important to know the magnitude of this need and this is the first factor in determining the utility rating

The extent to which the technology contributes to the need is the next factor that must be considered As the degree of contribution varies for each technology it is essential to clarify each technology s degree of contribution as a factor of its usefulness While this is a complex factor consisting of a number of elements a single coefficient shall be given here as representative of the multiplicity of elements

While it is not easy to express either the magnitude of need or the degree of contribution in quantitative terms it would be difficult to formulate any method which could yield accurate values In this survey however the following method has been used to find quantitative expressions which may be considered sufficiently accurate as data

For the magnitude of need needs of many kinds are compared with each other and their relative magnitudes are established This study focuses on the needs in all sectors of society and it is their magnitudes which are assessed This approach was necessitated by the absence of any common criteria or measures by which to assess needs of divergent natures Establishing the relative magnitude of need means expressing the need magnitudes in the form of their respective shares in the quantity total for all needs by first scanning all of society s needs and



then rating the individual needs according to the magnitude and their place in the total picture

As seen earlier the degrees to which technologies contribute to the needs involves a great number of complex elements of diverse characteristics Needs depend upon technologies for their realization to different degrees Social needs are not even necessarily satisfied by technologies or physical systems devices or machinery For example the need to strengthen elite oriented education depends more upon individual teachers than upon teaching machines In this case technology s degree of contribution to need is necessarily low Next the degree to which a given technology satisfies a need varies according to the individual technology While electric cars may completely satisfy the need to prevent air pollution caused by automobile exhausts the afterburners for exhaust fumes will satisfy the same need only partially Naturally the former s contribution to the need is greater than the latter s

While there are cases of a given technology s entirely satisfying a need there are also others of technologies which satisfy needs only partially For example the automatic dishwasher will satisfy part of the need to save household labor but will not bring about saving of labor in all household activities In such a case the degree of contribution must be discounted Moreover there are technologies which although they are not the main contributors to the needs play a secondary role For example the automatic air pollution measuring device represents an auxiliary technology in preventing environmental hazards and its contribution is low as compared with that of devices to desulphurize crude oil

While it would be ideal if one could assess the degree of contribution for all individual elements and obtain the degrees of contribution for each and every combination of such elements it would be too great a task to seek to do so here for the innumerable combinations of nearly 100 technologies and over 200 different needs For our present purposes we have decided to make intuitive assessments and express them through a point system rating The manner of rating is as follows

5 Very highly useful
4 Highly useful
3 Useful
2 Somewhat useful
1 Only slightly useful

The above standards are relative ones to be used in rating and the ratings are made by comparison with many other technologies

Once a quantitative assessment of each element is made in this manner the utility rating of a given technology to a certain need can be obtained bymultiplying the magnitude of the need by the degree to which the technology contributes Generally speaking a given technology is useful not only for a single need but also for a number of needs in a complex manner Accordingly the utility rating of any given technology is expressed as the sum total of its contributions to the needs which it serves

The purpose of the utility assessment is thus to make a comprehensive assess

ment of technology in the total social context by obtaining the combinations of all of society s needs and the major technologies in all fields

**Technologies subject to analysis** The object of this study is to assess the state of future technology and attempts were made to analyze the large number of new technologies now appearing This covers a wide range of technologies from those which have emerged as no more than ideas to those which have been partially developed into practical application Of the multitude of technologies related to the private industrial and other various sectors of society considera tion has been given to 92 major technologies for analysis

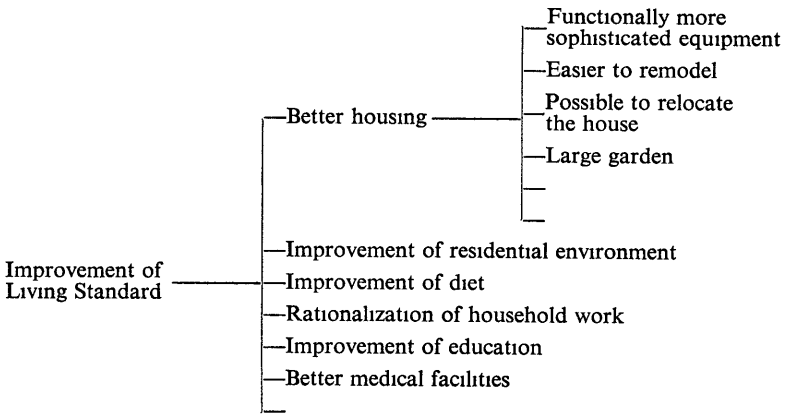
**Magnitude of needs** As has been seen earlier the questionnaire is the most appropriate means of assessing the needs in a relative quantitative manner By relying on this method it is possible to discover the comprehensive needs of the entire society and yet express these needs quantitatively in a unified measure

Questionnaires used were divided into those for society and living and those for industry both of them attempting to clarify the needs generated by society ten years hence The needs to be generated in the public sector and the private living sector are to be sought through the former and those to be generated in the industrial sector from the latter

The society and living questionnaire lists some desires (aspirations) concern ing life in the future society and asks the person interviewed to select their strong desires and thus the magnitudes of need can be obtained directly from the answers to the questionnaire

The prominent feature of the questionnaire is the tree of aspirations for selection in increasingly concrete and detailed stages As shown in Diagram 2 14 major society and living aspirations aimed at improvement of living

Diagram 2






standard are first enumerated, each of which then branches out into 7 to 10 concrete and more detailed headings Each of these smaller headings may be thought to represent a need

In using this selective tree chart one makes a selection from among the major heading and proceeds to the smaller headings By multiplying the fre quency of selection of the major headings by frequency selection of the smaller sub headings it is possible to obtain the final selectivity values for the smaller headings In other words in this way the stage by stage quantitative distribution of needs is indicated and if the aggregate need volume is constant this distribu tion is in direct proportion to the frequency of their selection from major head ings to smaller headings The magnitude of need can eventually be expressed for each item in this manner in a relative form as its share of the total quantity of all needs

Thus it is possible to discover the magnitude of needs on the basis of the frequency of selection for each of the headings listed in the questionnaire In Table 1 the magnitude of need thus established is indicated in the form of points (on a 10 point scale) for clearer comparison

The industry questionnaire aimed at discovering industrial needs of ten years hence contains questions on 10 items including business information system counter measures for labor shortages research and development projects and prevention of industrial pollution The questions are asked as in a conventional questionnaire and unlike the society and living question naire the magnitude of needs cannot be obtained directly from the results of the questionnaire Therefore the answers to the industry questionnaire are analysed and reorganized on the need axis into 12 items The magnitude of the need is sought separately for each item on an industrial basis and expressed on a 10 point scoring scale
(Table 1 )

**Table 1 Magnitude of needs in society**

| | | |
|---|---|---|
| 1 | Better housing | 9 |
| a) | Functionally more sophisticated equipment | 10 |
| b) | Easier to remodel | 7 |
| c) | Possible to relocate the house | 2 |
| d) | Flexible design wide range of selection | 8 |
| e) | Large garden | 4 |
| f) | Near the place of work | 8 |
| g) | Near educational and cultural facilities | 6 |
| h) | Second house | 8 |
| 2 | Improvement of residential environment | 10 |
| a) | Expansion of public parks and greenery | 9 |
| b) | Educational and cultural facilities leisure and shopping facilities | 5 |
| c) | Improvement of roads | 7 |
| d) | Improvement of modes of transportation | 9 |
| e) | District heating and cooling facilities | 6 |
| f) | Treatment of waste and garbage | 8 |

| | | |
|---|---|---|
| g) Improvement of sewerage and waste treatment facilities | | 9 |
| h) Prevention of environmental hazards | | 10 |
| i) Prevention of earthquakes storms and floods and fires | | 6 |
| 3 Improvement of diet | 2 | |
| a) Ready cooked and ready to serve | | 2 |
| b) Saves pre treatment in cooking | | 2 |
| c) Possible to store at home for long periods of time | | 3 |
| d) Very fresh | | 2 |
| e) High in nutritional value | | 1 |
| f) Good tasting and deluxe | | 2 |
| g) Rich in variety | | 2 |
| h) Good in appearance | | 1 |
| i) Tastes home cooked | | 2 |
| j) Gorgeous dinner at good restaurant | | 2 |
| 4 Rationalization of household work | 2 | |
| a) Generates time to spare | | 4 |
| b) Labor saving | | 2 |
| c) Reduces unpleasant and tiresome work | | 4 |
| d) Makes difficult work easy | | 1 |
| e) Contributes to economy | | 2 |
| f) Improves the quality of household work | | 2 |
| g) Makes household work more creative | | 3 |
| 5 Convenient shopping | 2 | |
| a) Cheaper to buy | | 1 |
| b) Simpler to pay for | | 2 |
| c) Can shop at home | | 1 |
| d) Can shop near home | | 1 |
| e) Bulk buying | | 1 |
| f) Can buy a large variety of goods at one place | | 3 |
| g) Wide range of imaginative merchandise | | 3 |
| h) Can receive advice and consult on goods | | 2 |
| i) Can satisfy shopping and leisure needs at the same time | | 2 |
| 6 Better working conditions | 8 | |
| a) Shorter working hours | | 9 |
| b) Reduced physical labor | | 5 |
| c) Reduced strain from mental labor | | 2 |
| d) Introduces unmanned operations | | 9 |
| e) Heightens creativity of work | | 8 |
| f) Good human relations at place of work | | 4 |
| g) Improvement in commuting conditions | | 7 |
| h) Provides re training organs | | 9 |
| i) Increases opportunities for choice of occupation | | 7 |
| 7 Leisure activities | 6 | |
| a) Active leisure | | 9 |
| b) Passive leisure | | 2 |
| c) Educational leisure | | 5 |
| d) Creative leisure | | 8 |
| e) Mental leisure | | 3 |
| f) Sight seeing leisure | | 9 |



| | | |
|---|---|---|
| g) Socializing leisure | | 6 |
| h) Social work leisure | | 2 |
| i) Work leisure | | 4 |
| j) Rest & Recuperation leisure | | 2 |
| 8 Home information activities | 3 | |
| a) Weather information | | 2 |
| b) Traffic information | | 2 |
| c) Shopping guide | | 2 |
| d) Leisure guide | | 4 |
| e) Information on consulting | | 4 |
| f) Information for choice from wide range of opportunities | | 2 |
| g) Information of administrative (governmental) services | | 2 |
| h) Information useful for school studies | | 3 |
| i) Information on general social trends | | 3 |
| j) Information culturally enriching | | 3 |
| 9 More sophisticated use of information by society | 6 | |
| a) Information contributing to smoother traffic systems | | 7 |
| b) Information regarding rationalization of distribution systems | | 7 |
| c) Information on rationalization of financial systems | | 4 |
| d) Information to improve comprehensive services offered by medical institutions | | 6 |
| e) Information on rationalization of government administrative work | | 7 |
| f) Information useful in crime prevention and security maintenance | | 5 |
| g) Information useful for prevention of environmental hazards and disasters | | 5 |
| h) Academic and scientific research | | 5 |
| i) Information necessary for work in the intellectual service industry | | 5 |
| 10 Improvement of education | | |
| a) Early education of small children | | 7 |
| b) Compulsory education proportionate to ability | | 7 |
| c) Special education for brilliant children | | 3 |
| d) Higher education (professional knowledge) | | 9 |
| e) (personality culture) | | 6 |
| f) Skill training (development of blue collar workers) | | 3 |
| g) Re training of employed adults | | 8 |
| h) Adult education (cultural) | | 6 |
| i) Adult education (practical) | | 4 |
| 11 Better medical facilities | 8 | |
| a) Preventive health measures | | 8 |
| b) Early detection of sickness | | 6 |
| c) Speedy and accurate diagnosis | | 7 |
| d) Treatment of fatal diseases | | 9 |
| e) Prompt treatment of less serious illnesses | | 2 |
| f) Treatment of mental stress | | 8 |
| g) First aid system (ambulatory) | | 7 |
| h) Thorough patient care | | 6 |
| i) Rehabilitation and post recovery care | | 5 |

| | | |
|---|---|---|
| 12 | Prevention of environmental hazards | 9 |
| a) | Air pollution (sulphurous acid gas and soot) | 9 |
| b) | (automobile exhaust gas) | 10 |
| c) | Water pollution (industrial waste) | 8 |
| d) | (home sewerage) | 5 |
| e) | Noise and vibrations | 6 |
| f) | Ground subsidence | 2 |
| g) | Obnoxious odors | 4 |
| h) | Electrical interference | 4 |
| i) | Radioactive pollution | 5 |
| j) | Pollution by waste materials | 8 |
| 13 | Prevention of accidents and disasters | 7 |
| a) | Automobile accidents (between motor vehicles) | 9 |
| b) | Automobile accidents (between motor vehicles and pedestrians) | 8 |
| c) | Aircraft accidents | 5 |
| d) | Ship accidents | 1 |
| e) | Train accidents | 1 |
| f) | Leisure accidents | 5 |
| g) | Earthquakes and tidal waves | 5 |
| h) | Storm and flood disasters | 5 |
| i) | Fires | 3 |
| j) | Industrial hazards | 7 |
| 14 | Better government administration | 7 |
| a) | Sophistication of means of popular participation in government | 8 |
| b) | Sophistication of means of proposing policies and deciding plans | 8 |
| c) | Simplification of administrative procedures and improvement of government services | 8 |
| d) | Improvement of crime prevention | 5 |
| e) | Strengthening of defence system | 3 |
| f) | Welfare for the aged | 9 |
| g) | Welfare for physically and mentally handicapped | 4 |

While the above method shows the quantitative magnitudes of the needs in the major sectors of society it was found that not all the needs of society are covered by the questionnaires and the questionnaires must be supplemented by the following needs

1) As the industry questionnaire more or less concentrates on the mining and manufacturing industries such industries as the agriculture and forestry service industry and commerce are not included in or surveyed by the questionnaire Thus it is necessary to add needs arising out of such industries
2) The two questionnaires do not cover the needs of the Government and other public bodies in their direct utilization of technologies These must be added
3) The technologies related to the social infra structure such as water



Table 2 Magnitude of needs in industry

| | Electrical & Electronic equipment & instruments | Transportation equipment | General machinery | Steel & Metals | Chemicals | Ceramics | Textiles Paper Pulps Rubber Products | Foods & Manne Products | Construction & Plant engineering | Mining | Transportation | Electric power & Gas | All industries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Improvement of information system | 10 | 9 | 9 | 8 | 8 | 7 | 7 | 8 | 9 | 7 | 10 | 10 | 8 |
| 2 Automation of production process | 6 | 6 | 8 | 7 | 6 | 8 | 7 | 7 | 5 | 7 | 6 | 4 | 6 |
| 3 Adoption of new production methods | 7 | 9 | 6 | 8 | 8 | 7 | 8 | 5 | 9 | 8 | 4 | 8 | 7 |
| 4 Automation of design testing measuring and analyzing | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 1 | 2 | 4 |
| 5 Increasing size of production equipment | 2 | 3 | 2 | 9 | 8 | 7 | 6 | 4 | 1 | 5 | 7 | 10 | 5 |
| 6 Improving quality | 4 | 3 | 6 | 3 | 5 | 3 | 3 | 2 | 4 | 1 | 1 | 1 | 3 |
| 7 Rationalization of transportation | 1 | 3 | 1 | 5 | 4 | 6 | 4 | 6 | 1 | 5 | 1 | 3 | 3 |
| 8 More effective safe keeping and storing | 2 | 2 | 2 | 1 | 4 | 4 | 1 | 5 | 0 | 3 | 1 | 1 | 2 |
| 9 Securing water and energy supply | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 0 | 2 | 1 |
| 10 Development of employee abilities | 9 | 7 | 9 | 8 | 7 | 6 | 7 | 9 | 8 | 6 | 7 | 8 | 8 |
| 11 Improvement of work environment | 1 | 3 | 2 | 3 | 1 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| 12 Prevention of environmental hazards | 1 | 3 | 3 | 7 | 8 | 7 | 5 | 3 | 4 | 5 | 2 | 8 | 5 |
| Industry weight (w) | 39 | 50 | 46 | 52 | 54 | 8 | 23 | 49 | 83 | 2 | 32 | 10 | |

energy and modes of transportation not being direct concerns of enterprises and people their needs tend to be understated in the questionnaires This must be corrected

As it was not possible to measure through questionnaires the magnitudes of all conceivable needs it has become necessary to make corrections and additions as described above With the addition of these needs there may be thought to be three sources of needs and the sum total of the needs arising out of the three sources may be considered the total needs of the society

It must be noted however that the need quantities thus obtained represent those of the needs within each sector and the absolute quantity of needs varies from sector to sector Therefore in arriving at the total needs of society it is necessary to weigh one sector against another This can be done by predetermining the proportionate share of each sector in the total needs of society and making any necessary final adjustments accordingly

For the purpose of the present study we have used the following ratios

**Table 3**

| | |
|---|---|
| Society and living sector | 0 4 |
| Industry sector | 0 3 |
| Corrective (supplemental) sector | 0 3 |
| Total | 1 0 |

These figures of comparative importance of the sectors were tentatively determined from a consensus of the researchers involved In view of the importance of this fundamental factor in deciding the magnitudes of needs policy considerations really should be relied upon to a certain extent

**Degree of technology's contribution to need** The degree of each technology s contribution to need is obtained on a 5 point scoring system by matching each of the 92 technologies to the individual needs in the society and living and the industry sectors

This exercise results in an extremely large matrix a small part of which is shown in Tables 4 and 5

**Calculation of utility ratings** Using the magnitudes of needs and the degree of technology s contribution thus quantitatively obtained these are then multiplied to obtain the utility rating for each of the 92 technologies

To explain the method of calculation a fixed quantity is tentatively taken for the sum total—this sum total has been set at 1 0 here—of the needs of each of the two sectors of society and living and industry the magnitude of each individual need is determined and the utility rating is then obtained for each individual need in the sector by multiplication with the degree of contribution In the industry sector after adjusting for such weightings as were determined by the sizes of the industries this yields the total quantity of industrial needs



**Table 4 Degree of technology's contribution to needs (society and life)**

| | Home facsimile | EVR | CATV | CAI | Super large computer |
|---|---|---|---|---|---|
| Leisure activities | | | | | |
| a) Active | | 1 | | | |
| b) Passive | 2 | 3 | 4 | | |
| c) Educational | 3 | 3 | 2 | | |
| d) Creative | | 1 | | | |
| e) Mental | | | | | |
| Home information activities | | | | | |
| a) Weather | 3 | | 2 | | 3 |
| b) Traffic guide | 1 | | 2 | | 2 |
| c) Shopping 〃 | 2 | | 3 | | |
| d) Leisure 〃 | 2 | 2 | 3 | | 1 |
| e) Consulting | | | | | |
| Improvement of education | | | | | |
| a) Early education | | 3 | 2 | | |
| b) Compulsory education proportionate to ability | | 3 | 1 | 5 | 2 |
| c) Brilliant children s education | | 1 | | 2 | |
| d) Higher education (professional) | | 2 | | 3 | 2 |
| e) Higher education (personality & culture) | | 2 | | 1 | |

Remarks (1) EVR Electronic Video Recorder
CATV Community Antenna Television
CAI Computer Assisted Instruction

Remarks (2)

| | |
|---|---|
| Active leisure | Sports hiking motoring |
| Passive 〃 | Sports movies theatre |
| Educational 〃 | Reading music and art appreciation |
| Creative 〃 | Painting handicraft gardening landscaping |
| Mental 〃 | Go Shogi chess |

In the supplemental sector as the need magnitudes cannot be sought individually it was decided for expediency s sake to compare the supplemental items to the technologies utility ratings already obtained for the society and living and industry sectors which sectors serve as the standards and then to determine intuitively the utility ratings for the supplemental sector

The utility ratings for the three sectors are then weighted for the size of the total needs of the each sector by multiplying by the coefficients shown in Table 3 Then by addition the utility rating for each of the technologies throughout

Table 5 Technology s contribution to needs (Industry)

| | Automatic designing | DDC | Work robot | crude oil desulphu rization |
|---|---|---|---|---|
| Automation of production process | | | | |
| Electrical & electronic equipment | 2 | | 2 | |
| Transportation equipment | 2 | | 3 | |
| General machinery | 1 | | 4 | |
| Steel & metals | | 3 | 3 | |
| Chemicals | | 5 | | |
| Increasing size of production equipment | | | | |
| Electric & electronic equipment | 1 | | | |
| Transportation equipment | 1 | | | |
| General machinery | | | | |
| Steel & Metals | | 3 | | |
| Chemicals | | 4 | | |
| Improvement of work environment | | | | |
| Electric & electronic equipment | 2 | | 2 | |
| Transportation equipment | 2 | | 3 | |
| General machinery | 2 | | 3 | |
| Steel & metals | | 4 | 3 | |
| Chemicals | | 4 | 1 | |
| Prevention of environmental hazards | | | | |
| Steel & Metals | | 1 | | 3 |
| Chemicals | | 1 | | 4 |

the three sectors is obtained These sums are then converted to a 10 point system and the scores thus obtained are the final utility ratings for the tech nologies

Partial results are shown in Table 6 There it may be seen that while the utility ratings range from 2 points for the communications satellite to 10 points for the largest size computers the main distribution concentration is around 5 and 6 points

This study is a macroscopic treatment of technologies and needs and is not an analysis in minute detail Although there is still room for finder study on the ratings of given technologies it may be said that this study at least anticipates the future social utilities of a group of technologies by comparing a large number of technologies utility ratings

**Object of this survey** This survey s aim is to suggest a new approach to as sessing technologies through social needs and to represent a practical technique for such assessment This is an analysis involving the total needs of society and entire groups of technologies and it is unique in its broad scope Since this



Table 6 Utility rating of technology

( ) =Utility rating by points

| | |
|---|---|
| Technologies having particularly high utility ratings | Super large computer (10)<br>Direct digital control (8)<br>Electric car (7)<br>Work robot (7) |
| Technologies having fairly high utility ratings | Home facsimili (6)<br>Electronic video recorder (6)<br>Crude oil desulphurization (6)<br>Synthetic paper (5)<br>Automatic meter reading (5)<br>Hovercraft (4) |
| Technologies having not very high utility ratings | Television set to be hung on the wall (3)<br>Nuclear cargo ship (3)<br>Mobile house (4)<br>Broadcast satellites (2) |

represents and entirely new approach progress was made in the study through trial and error The techniques employed lack finesse and are in many ways imperfect Moreover the data and coefficients employed in the process of analysis are not necessarily accurate

It needs to be further refined in order to be established as a technique for assessment but it may perhaps serve as a beginning to the important and difficult task of assessing technologies macroscopically by correlating technolo gies to social needs

## CONCLUSION

This report proposes the assessment of technologies on the basis of values co existing in a complex manner in the multichannel society It proposes an approach to the assessment of technologies on the basis of their effective con tribution to the realization of plural values an analysis through the combination of values needs and technology

While specific techniques and concrete analytical results were produced regarding the assessment of technologies based on needs it is still necessary to refine the techniques and make the data and coefficients used for the analytical process more accurate and more detailed

On the analysis of values and needs it was impossible to go beyond simply suggesting an approach A more practical method of analysis and the assessment of values themselves remain to be achieved By combining these two it should be possible to assess technologies on the basis of values

# SPREAD OF SOFT TECHNOLOGY TECHNOLOGICAL INNOVATIONS AND THEIR IMPACT IN MODERN MULTI-CHANNEL SOCIETY

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## MULTI-CHANNEL SOCIETY AND OVERLAPPING VALUES

**Forecast for the 1970's** In this year s January 1 issue the Asahi Shimbun devoted 16 pages to special articles on forecasting the 1970 s The editor selected 100 leaders responsible for Japan s future and in an attempt to bring out some consensus asked them to reply to a detailed questionnaire on various important problems which are expected to be major determinants of changes in the 1970 s

Among those who replied there were many Japanese scholars journalists and business executives who participated in this international conference The Advanced Techno Economic Information Center with which this author is affiliated assisted the newspaper in compiling this survey

One of the questions was What word will symbolize the 1970 s? and each respondent was allowed three answers to this question Among the leading replies were the 62 mentions of change the 36 of instability the 28 of affluence and the 27 of discontinuity These words are particularly significant as expressing the essential qualities of the multi channel society

Change and the instability indicate the expectation of radical changes which our society may undergo in the 1970 s They indicate the successive birth of new industries and the shortening of the technical life cycle

The life cycle of manufactured goods has been shortened to one tenth during the past half century It took more than 50 years before the internal combustion engine and the vacuum tube were put into practical use but only several years were required for the jet engine and the transistor It must also be noted that the diffusion speed for new products after their emergence has been accelerated

In Japan television was diffused into the majority of households less than 10 years after its invention and development The cycle of invention development diffusion and stagnation has been considerably shortened Turnover in industry having thus become noticeable this has resulted in the rise and fall of industrial firms In such an era of rapid technological innovation Japan has continued to

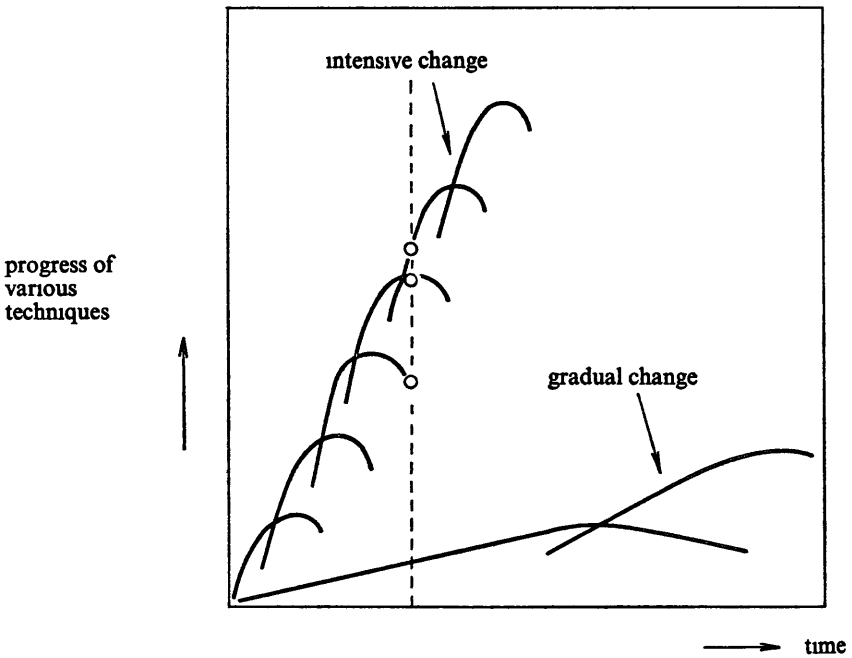


Chart 1 Changing Technological Innovation and the Existence of Plural Values

grow by skillfully introducing such innovations This was possible because Japanese industry tolerated the existence of different values

As indicated in Chart I rapid change is achieved by the successive overlapping of new values over old When change is slow it is usually that only one set of values exists

Japanese society has traditionally tolerated the co existence of plural values For example the Shinto shrine and the Buddhist sanctum still co exist in the same household people sleep on western style beds in tatami matted rooms and people wear both western clothes and Japanese kimono Such mixed ways of thinking have enabled the Japanese to introduce the transistor along with the vacuum tube and allowed steel makers to operate the converters and open hearth furnaces side by side

This unique character of Japanese society has helped people adapt quickly to rapid technological innovation Recognition of the existence of numerous divergent values and selection of the most proper is a fundamental strategy in the multi channel society

It may be easily understood that affluence will lead to the availability of wider options There is no freedom of choice in poverty and being able to choose whatever one likes from the various products available is the condition of



affluence Characteristic after 1970 will be the emergence of diversification and polarization of values in both society and industry

Discontinuity has become a popular word in Japan and discontinuity may be recognized in the university disputes and many other aspects of society this has been caused by the coexistence of qualitatively and quantitatively different senses of values held by young and old people

Beneath these words symbolizing the vision of the future there exist plural values and diversification This indicates the approach of the multi channel society and in such a society it will become essential for us to develop devices which perform multi channel functions to handle massive information

The development of material civilization and spiritual culture prompted people to emerge from the days when only narrow paths in restricted fields were trodden and helped them to acquire the option of choosing what they like from the varied ways of thinking diversified products and complicated society In one sense such development imposes upon people difficulties of choice and means and the consequences of erroneous choice will become more serious As a result there will be increasing demands for forecast planning based upon scientific methods and at the same time greater importance will be attached to the fore cast planning technique

**Two Impending Dangers** Japanese industry in the 1970 s will conquer change and achieve affluence but those who responded to the questionnaire overlooked the very important word exhaustion The word exhaustion indicates two high barriers or crises which stand in the way of Japanese industry and it is upon these crises that greater attention should be focused in the 1980 s Proper meas ures must be devised to cope with them

The first problem is that of man About six months ago I had the honor of addressing the First National Congress of Superintendents Among various subcommittee meetings held by the more than 1 000 supervisors and foremen in attendance the subcommittee meeting the worth while life reportedly at tracted the most participants This subcommittee s leadership replaced that of the QC or IE subcommittees which had been in the spotlight until a few years ago There has been a rapid change in the values held by blue collar workers and the desire for money which had been their major value has been replaced by participation awareness Thus has resulted the discontinuity of values

Concerning the problem of man the remarkable shortage of labor has become a large problem The tendency in Japan since 1954 has been for each woman to give birth to one or fewer female babies

While the resultant population decrease has been more than offset by pro longed life expectancies but this increase of the life expectancy has reached its peak in 1969 Children born in 1954 will reach maturity and join the labor market in 1974 but the working population will decline drastically from that time There will be a clear exhaustion of high quality workers This will make it imperative that Japanese industry rid itself of its labor intensive character

The other danger is that of resources The rapid growth of the postwar Japanese industry was brought about by industries taking advantage of Japan s excellent port facilities to import high quality raw materials from abroad and then to use them in the mass production of such processed products as steel

textiles and ships All of these products are priced per weight unit and their production was assisted by the abundant availability of cheap labor However with increased production and the improvement of Japan s international posi tion which rank second only after the United States in the free world the ex haustion of resources has become obvious For example the steel industry has felt the shortage of coking coal there have been difficulties in obtaining such nonferrous metals as nickel and cobalt and it is said that the oil deposits will be exhausted in 25 years This situation is not peculiar to Japanese industry Indeed resource shortages are a problem common to all nations of the world

How can such dangers be met? For our answer we must look to the multi channel society Industry must be transformed so as to need less resources and man s intellectual value must be fully utilized Efforts must be made to transform property producing industries to the intellectual and information oriented industries

## PROGRESS OF INDUSTRY

### —HOW WILL INDUSTRY CHANGE?—

**Changes of Indicators for Industrial Structure** The form of industry in the multi channel society must transform itself continuously with changes in environment The social structure will become complicated and gigantic in size market de mands will become individualized and diversified and industry will come to seek higher product values which derive from intellectual values added to ordinary processing

In order to examine the course of technical progress the Economic Planning Agency and the Economic Council established the Technological Progress Investigation Committee In November of 1969 this Committee issued its report—the result of nearly a year of discussion This author was a member of the Committee and was responsible for predicting industrial structure The industrial structure undergoing change in parallel with the development of technical innovation becomes accordingly necessary for us to take into ac count progress in scientific technology and new development in human activity While economists have traditionally adopted the rate of heavy and chemical industrialization as an indicator of industrial development and urged the crea tion of the capital intensive industries it is my belief that such views do not fit current realities Other indicators must be sought

It was to that end that the Committee tried to approach its task from the two aspects of production technology systems and human activity systems As an indicator of the production technology systems the industrial production structures were divided into three categories materials processing and assembl ing and a study was made of changes in their shipping amounts Next as an indicator of the human activity system products of ultimate demand were grouped into foodstuffs clothing and spatial ware Spatial ware is a syn thetic term created to include products related to daily life (washing machines television sets and others) those related to production (machine tools moulding



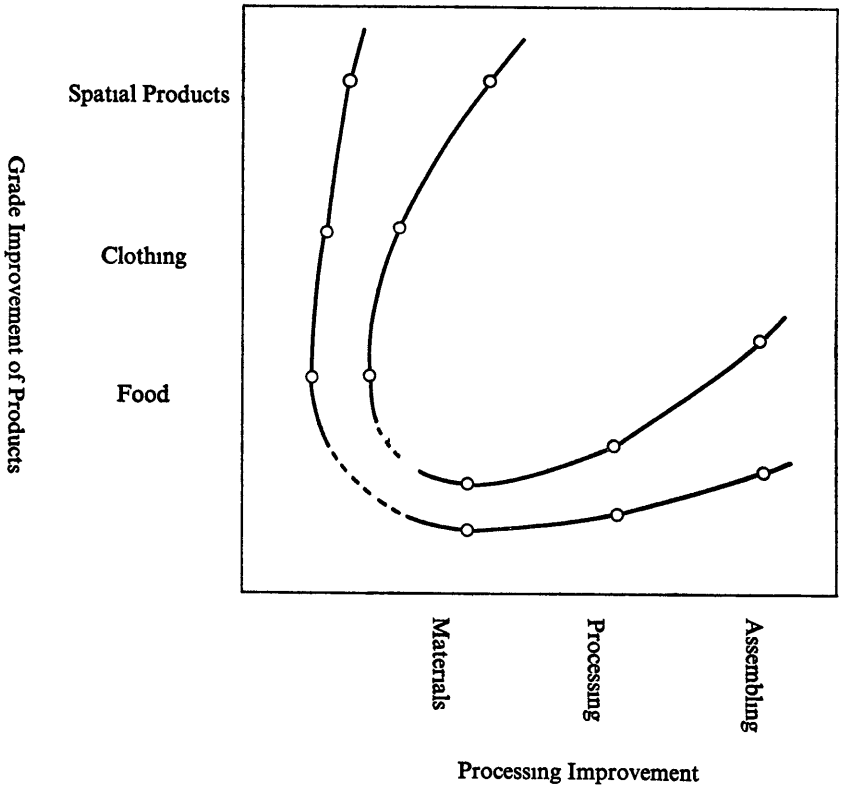


Chart 2 Progress of the Industrial Structure as Deduced from the Indicators of Pro duction Technology and Human Activity

machines and others) and those related to transportation (automobiles tele communications machines and the like )

The changes in these indicators as the economic society develops are indicated in graphic form in Chart 2

In the undeveloped industrial structure each indicator shows tendency indicated by the solid line (a) but as the human desires move up from primary to secondary or tertiary areas the ratio of spatial products to foodstuffs increases production techniques progress from materials to assembled goods and the improvement of the industrial structure is as indicated by solid line (b)

In order to substantiate the indicators let me present a comparison between the Japanese and American indicators If industrial shipping data is collected and broken down into shipping amounts for the material industry the process ing industry and the assembling industry clear differences are seen between the

**Table 1 Comparison by processing stage compositions of major countries (Nihon Keizai Shimbun Dec 16, 1968)**

| Countries | Japan | | | U S | West Germany | |
|---|---|---|---|---|---|---|
| | 1951–1955 | 1956–1960 | 1961–1965 | 1962 | 1952 | 1961 |
| Material | 54 9% | 48 2 | 42 1 | 25 3 | 42 6 | 36 2 |
| Processing | 36 2 | 37 8 | 41 3 | 49 1 | 42 7 | 41 3 |
| Assembling | 8 9 | 14 0 | 16 6 | 25 6 | 13 7 | 22 5 |
| Total | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 | 100 0 |
| Total accumulation for 5 years | Z2 $6\times10^{12}$ | Z52 $9\times10^{12}$ | Z113 $7\times10^{12}$ | $3 $627\times10^{8}$ DM $1\,253\times10^{8}$ DM $2\,590\times10^{8}$ | | |

Sources Japan Industrial Statistics Items Part America Annual Survey of Manufacture West Germany Statietischse Jahrbuch

**Table 2 Composition ratios of "food," clothing, and space" in major countries**

(Economic Planning Agency)
(Unit %)

| | Japan | | U S | West Germany |
|---|---|---|---|---|
| | 1955 | 1966 | 1966 | 1966 |
| Food | 50 7 | 35 2 | 26 8 | 23 8 |
| Clothing | 15 0 | 10 9 | 11 5 | 13 2 |
| Space | 34 3 | 53 9 | 61 7 | 62 9 |
| Life | 10 5 | 16 5 | 19 3 | 18 9 |
| Production | 12 3 | 18 0 | 15 7 | 24 9 |
| Transportation | 11 6 | 19 4 | 26 7 | 19 2 |
| Total | 100 0 | 100 0 | 100 0 | 100 0 |

(Note) Sources Japan Industrial Statistics Items Section America Annual Survey of Manufactures West Germany Statistisches Jahrbuch

two countries as indicated in Table 1 The ratio of assembling is clearly larger in the United States than in Japan

Next shipping amounts were compared by items and markets and a structural comparison was made of major countries foodstuffs clothing and spatial goods as indicated in Table 2

From 1955 to 1966 the ratio of foodstuffs and clothing declined in Japan while that of spatial goods increased rapidly In comparison with the United States Japan s foodstuffs ratio was high while that for spatial goods was low



The high U S ratio in the transportation sector indicates the development of the information society supported by improved systems of distribution

**Emergence from Materialistic Values** It has become clear that the human activity systems in the multi channel society continue to be diverse and of increasingly improving quality while the production technology systems become more complicated and systematized

Although there is only one production process for such materials as steel and ethylene assembled products comprised of large numbers of parts contain within themselves the possibility of large numbers of combinations The market trend which indicates a transition from demand for foodstuffs to satisfy primitive desires to demand for luxury goods to satisfy spiritual desires has also shown the change from uniform to individual desires In this way future industries will focus on the existence of plural values and a high multi channel capability will be required to cope with the situation

What will be the future industrial structure? For one thing materialistic values will be replaced by information values and intellectual values That indicates the transition from materials to assembled goods from necessities to high quality goods

It seems that the information indicator will be an appropriate standard for determining the pattern of advanced countries In other words it is possible to judge the standard by looking at whether or not the value added by intangible values—research development planning production techniques artistic value design and the degree of process—surpasses the material value The question is to what degree the intellectual value of information is systemized

In such an era what changes do industrial functions undergo? As the manufacturer of hoes might be cited as an example of an obsolete industry let us compare his work content with that of a computer manufacturer computers being regarded as among the most modern industries

Suppose that the hoe company produces 50 hoes a week and the computer company produces one medium sized computer a week Their respective total weights are equally equivalent to one truck load Their basic material generally is iron of similar quality Yet the price of the former is ¥100 000 while that of the latter is about ¥50 million—500 times higher Why the difference?

The reason is clearly that the difference results from their different information values While only two or three sheets of drawings are needed for the production of hoes more than 50 000 drawings are necessary for the computer Each sketch is information designating the length of a part in millimeters calling for the use of special steel SCM and specifying the use of hard chromium plating for the finishing coating These sketches could be called accumulations of technological information The difference in value between the hoes and the computer can be thought of as existing in the different amounts of information put into their production With the modernization of industry information becomes increasingly more important

In industry this trend is seen in the planning and research sections where information is important rather than in the manufacturing section within which the manufacturing function is performed What is important is the gathering and processing of information not the production of goods

## SYSTEMS APPROACH

### —WHAT KINDS OF TECHNOLOGIES WILL BE NECESSARY?—

**Changes in technological innovation** Technological innovation is a technological progress which has an economic impact on the market it differs from invention The invention of the transistor and the laser may be cited as examples The former has had considerable effect on the industry and is considered a representative example of technological innovation, while the latter has stayed in the laboratory and played little role in technological innovation

In the past decade the character of technological innovation has changed with the introduction of the idea of systems and this trend will continue into the 1980 s and beyond

Around 1940 such epoch making invention as plastic synthetic fibers computer nuclear fuels and semi conductors were successfully accomplished and it was these products which prompted the emergence of large industries However no such inventions or discoveries have been seen since 1960 nor are any expected in the 1980 s or thereafter

Industrial development has been brought about not by inventions and discoveries but by the application and skillful combination of existing technologies into other fields As indicated in Chart 3 the day will come when technological proliferation will mean that systems will replace unrelated changes in isolated technological innovations

A typical example is NASA s space development The success of the Apollo program was the result of remarkable technological innovation but there were few epoch making inventions or discoveries made in the process of developing the spacecrafts The result was achieved through normative means systems techniques with a fixed aim and was a victory of the systems approach of appraisal selection and proper combination of existing techniques

The systems approach concept which became popular with NASA s success has been quickly adopted by civilian companies This is the typical trend in American industry and American firms business substance has changed from manufactured goods to systems A similar trend is clearly visible in Japan

While the development of individual industries based on the resources and energy concept has been the industrial model in industrial societies there is now a transition in progress toward functional industries depending upon systems technologies to systematize individual products into module or package forms The functional industry is an industry which aims at discovering or putting into practice the course most likely to satisfy human or social desires In this case industry s role has been transferred from product making to system making and the industrial structure is expected to center around the formation of networks As products enterprises and public enterprises become increasingly intricate these must be treated as one system and their proper use studied For example such system developments as education medical treatment urbanization information transportation space environmental hazards and underseas development are some of the important projects which have been taken up and on which gradual progress has been achieved



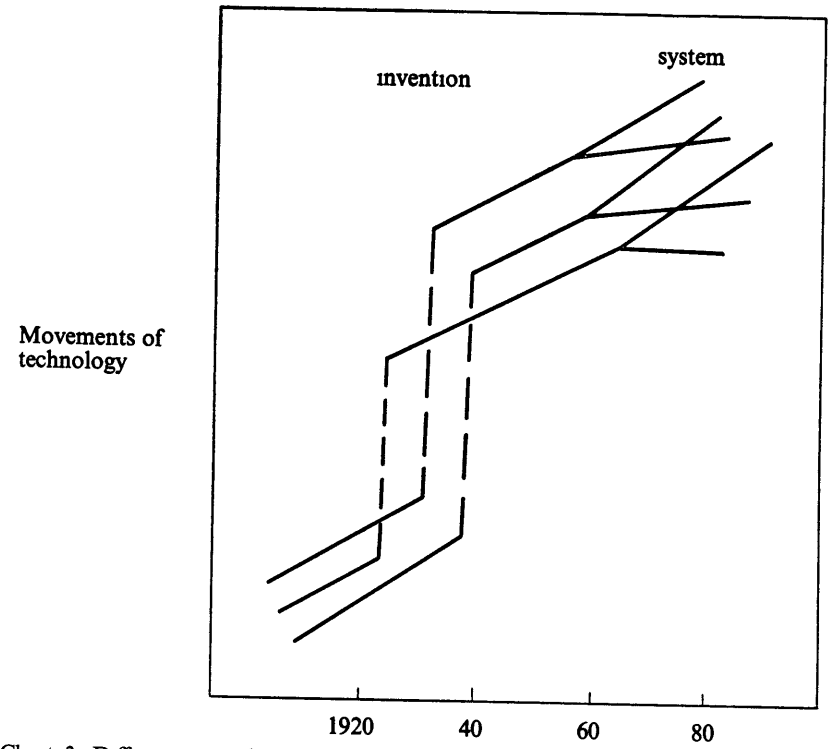


Chart 3 Differences in the Form of Technological Development in Chronological Order

**Development of Soft Technologies** The FROG (Future Research Operation Group) of the Japan Techno Economics Society is a committee of industrial leaders who have gotten together to study the future As a committee chairman this author has summarized the series of discussions over the past year As a result I have discovered the importance of the concept of the systems approach and this discovery has also been confirmed by the Future Industry Survey Team dispatched by the Society

In the future technologies will exceed their boundaries and be incorporated into networks of various fields outside of the technologies themselves Thus soft technology systems which systematize information will become dominant These will not be limited to the telecommunications or production systems but will extend to such fields as education medical treatment crime prevention waste disposition and other approaches to further human society

Soft technologies will be highlighted as ways to approach systems scientifically These technologies related as they are to forecasting planning and experimenting for systems analysis operational research and simulation enable us to make

forecasts with high validity plan with high efficiency and control experiments Put into practice the result as indicated in Chart 4 will be supported by the striking development of the information technologies including the telecommunications and control centering around the computer

Until now industrial society has seen the separate growth and development of steel metallurgy the internal combustion engine and thermal power generation to form an independent and gigantic technology Yet change in the future society will be regulated not by such separate and independent technology systems but by a new technological system—soft technology—which will come into being by transcending such stages to assume a prominent position in industry The new technological system will support the formation of a new organic system realized by the selection and combination of diverse elements or modules including social economic humanistic and spiritual aspects and it is this which will become the nucleus of the multi channel society In parallel with the transition from technology for production to technology for information intellectual technologies will replace machinery technologies in the leading role as the ruling technology of the society will change from hard to soft The technological system for this is thought to be the soft technologies which systematize information horizontally connecting innumerable fields

At present business executives feel a strong sense of discontinuity This feeling might be said to be caused by the fact that the leading role performed in the technological fields has been shifted from hard to soft technology

In order to survive in such a future society businessmen must have the special qualities characterized by two IN s INterdisciplinary and INtuitive ability The former is essential for the formation of systems and the latter is necessary for decisions within the system

The OST in the United States has emphasized the importance of the new concept of technological assessment and its words also attracted wide spread interest in Japan Frankly speaking compared with the striking development of scientific technologies social strains have become extremely visible in the United States

Environmental pollution public safety hippies the Negro problem and drug addiction have come to the force and have inflicted heavy damage on the society It is here that assessment and appraisal of technologies has become necessary and it is here that importance has been attached to the status of technology in industry and society Moreover this will likely become a problem common to all advanced countries in the future

It is clear that the concept of technology assessment is important for promoting the healthy development of the social system and it is this need for the technology assessment which makes us realize that a great importance lies in the role which is performed by technology in the multi channel society



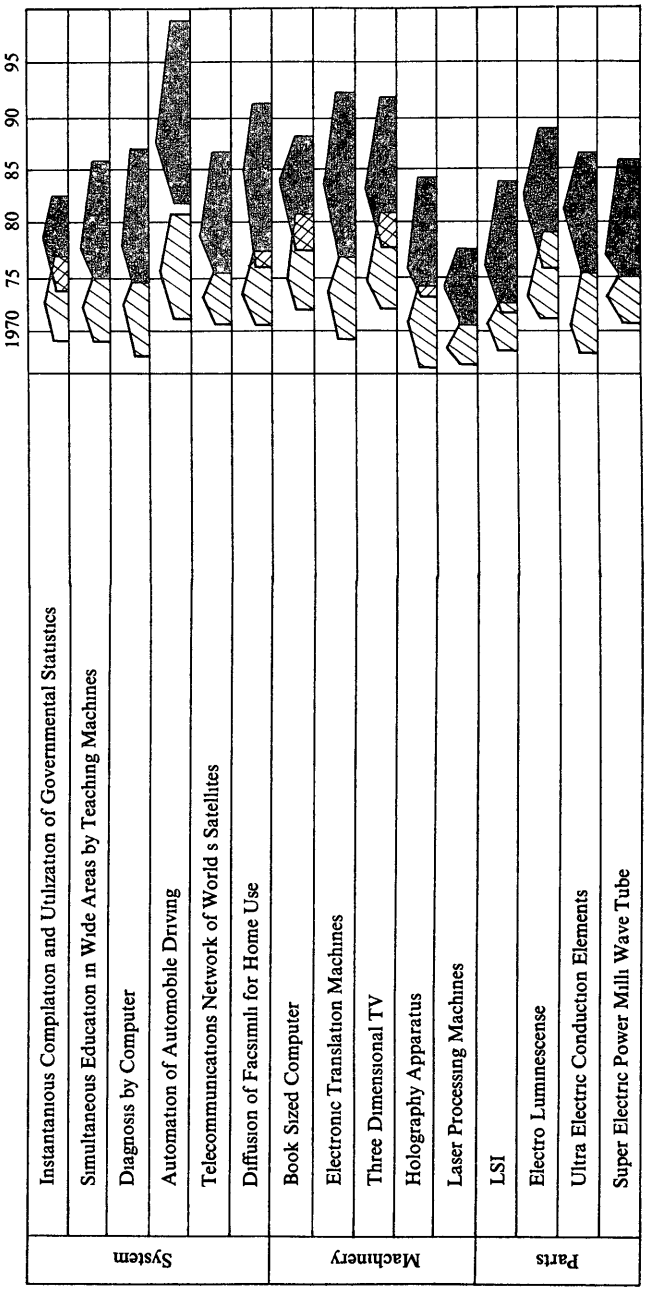


**Chart 4 Forecast of Electric Industry Technology**
*(Delphi Method Japan Electronic Industry Development Association)*

# A FLEXIBLE SYSTEM IN EDUCATION

MASAO GOTO
*President University of Oita*

## A FLEXIBLE SYSTEM IN EDUCATION

We perceive the Japanese society that exists in the changing world of today as a high option society with a multiplex structure One of Japan s urgent problems at present is to think out a total system of education that will reach the entirety of this greatly changing society

Japan which until 100 years ago had maintained the old feudal system succeeded in developing as a modern nation by absorbing new knowledge from various foreign countries The new educational system that adroitly managed to have an educational system peculiar to Japan called terakoya (Temple schools) or juku (private schools) continued alongside with the school education system from the West had been very effectively promoted by such outstanding educators as Yukichi Fukuzawa It was wise to have developed such a system in Japanese society which is generally characterized as being a high density society a homogeneous society and a high energy race society

After World War II the school education system was revised in accord with the educational system of the United States of America and guaranteed academic freedom by the new Constitution universities also made a new start

However around that time education distinct from the hitherto school education began to develop Education programs such as TWI JST MTP QC MR OR and IE were systematically organized and put into operation in government offices local public organizations and public and private enter prises

And in recent years with the development of the electronic computer systems including MIS hardware and software education entirely different from the previous type of school education were adopted and education of the public at large using mass media such as television has rapidly developed In 1968 the one century history of the modernization of Japan starting from the year of the accession to the throne of Emperor Meiji was over and in 1969 Japan s new century began

In this new century Japan will perhaps be the symbol of an era of change This generation will have to continuously pursue education over a wide range of fields throughout their entire lifetime in order to cope with the rapid changes in social structure industrial organization and the like and to develop the power to control these changes Much of this education will be possible only with a new educational system for society In other words a system of total education has come to be more important than school education alone and you can see the effect of this in the students now in schools We must now think of an education system as being a total system including school education

## UNIVERSITY EXTENSION SYSTEM

School education also must endeavor to keep up with and fit into such an extended system of education We must therefore reconsider the position of school education within the total system of education

The speed with which children in a high option society develop has rapidly increased There is a notable trend to acquire learning and to respond sensationistically through sense experiences and by pattern and repetition Children brought up this way will surpass the present generation They can envision the future twenty years thirty years from now There are some who think that the shape of the future is to be more easily found in the dreams of three to four year olds than in adults A new channel of education which can adjust to the change in the speed of human development must be designed if we are to develop the ability to create a future society to overcome the feelings of alienation and estrangement accompanying the increase of entropy and to cultivate the ability to set up a system in which life is worth living

For this purpose C A I (Computer Assisted Instruction) employing the Simulation Education Machine is effective Introducing for the development of children s memory circuits the cybogue system—a combination of human being and machine—is also effective There is no doubt that these techniques will be of great help in developing children s creativity It is likewise necessary to include as part of the education courses of regular high schools and high school level professional schools as well as in general education courses in universities such words as ALGOL COBOL FORTRAN etc and to have the students assimilate them just as they would a 2nd or 3rd language

In order to eliminate the gap between students and teachers faculties of universities and other educational organs must make efforts to accommodate themselves sensitively to the trend—students acquiring learning sensationistically according to patterns In a society where the amount of information is rapidly increasing the trend of mass media such as television toward appeal to the senses rather than to reason and to teaching through means of patterns will increase more and more in the future If left to develop unilaterally the difference in the pattern of perception between the students and the teachers will further deepen and conversation between the two will become increasingly difficult If this channel of mutual understanding is closed there will be explosion and destruction This phenomenon can be observed in every category of society and today when the old and the new generations live only complicatedly together



we feel that the danger cannot be overlooked Although it is the duty of the universities to save society from such a danger these days the universities themselves are caught up in the whirlpool of identical problems So now when the system of extended education is being diffused the metabolism of the universities has broken down and not only are there symptoms of hardening of the arteries but their doors are not even open to the community

The gap or imbalance between the fields that can keep abreast of the big changes now taking place in society and the fields that cannot catch up with them will become wider and wider This necessarily occurs in any changing society The student movements in our universities are related to the fact that our present society is radically changing Student problems are deeply related to all problems arising now in society

At the Japan U S joint symposium on The Supra Technological Society sponsored by J A T E S (Japan Techno Economic Society) held in September 1968 Dr Daniel Bell Chairman of the Commission on the Year 2000 Academy of Arts and Sciences who participated in the meeting from New York over radio waves said Until now to graduate from a university meant for many people to arrive at the summit of a mountain It meant the promise of a high salary and a prominent position in society Today however this set up is giving way and the summit has suddenly become a slope consequently great psychological tension has invaded the society of students In Japan too psychological tension has led to an explosion of student power and yet changes in university organization to cope with the changed generation are quite slow The party in power economic organizations the Central Educational Council the Association of Private Universities the Association of National Universities and the universities themselves all recognize the necessity of a broad revision of the school education system but they are still only groping and hardly any progress is being made

Since the speed of change in the world is getting faster and faster—faster today than yesterday faster tomorrow than today—efforts must be made to revise and improve the educational system so as to be able to adapt the manifold potential of human beings to the changes in society and to alleviate the psychological tension on students Alvin Toffler warns of the danger of future shock caused by the sudden approach of the future but special efforts must be made to develop a system that can educate people who will be able to create a future if we aie to suppress the destructive behavior which originates in feelings of alienation accompanying the increase of entropy and which turns back along the route to the primitive past

The universities must also open their doors to the community when you have a system of extended education Everyone is taking an increasing interest in educational organs not only mutually sharing their programs and facilities among themselves but even opening their facilities equipment data and the libraries of higher education organs such as universities to the community The Association of National Universities the Investigation Committee for the Revision of Tokyo University and the Liberal Democratic Party (which is the party in power) all point this out An effort to plan a flexible administration must be made

For the universities to become open the link between them and society

must be closer than ever In the changing societies of today whether these societies be capitalist or socialist universities cannot fulfil their public respon sibility unless there is cooperation between them and society Furthermore to prepare people for living in a changing society best use of experiences in the organization of society must be made A system has to be devised in which the social system constantly promotes changes in the educational system and the education system feeds back new theories techniques and methods into the social system This is not to admit that the functions of research and education carried out by universities are subject to or dependent upon society It goes without saying that leadership in education and research should be based on the principles of university autonomy and academic freedom even in the future But the universities must not lose the spirit of serving society through good education

Dr Daniel Bell says that the speed of economic growth in post industrial society depends on human capital rather than on material goods and truly educational organs such as universities are factories for producing outstand ing human talent The quality of the product must be guaranteed to the customers who are their users and the educational organs must not forget their follow up service to the buyers

## MULTI-CHANNEL INTERNATIONAL UNIVERSITY SYSTEM

All system of education within and between organs of higher education such as universities must be multi channel Students studying in open univer sities will be youths who have been brought up on the ordinary scholastic courses as well as comparatively older people All generations will study together and freely choose their major as well as minor fields Many channels should be provided and a flexible administration should be set up so as to make possible a choice of education organs education programs and subjects

The realization of a system of mutual transfer of credits between universities mutual exchange of faculty members the right or possibility of attending lectures at other universities without having to change one s registration and acquiring credits through the University of the Air (studying by means of satellite broadcasts) is desirable If such a system were not limited to this country alone but became an international reality in which there would be mutual cooperation with universities of other countries it would be even more effective and profit able To cope with an increasingly diversified and complicated society educa tion within universities must also be multi channeled and furthermore the realization of a multi channel university system surmounting barriers between countries and continents is to be hoped for

## SUMMARY

**Summarizing the above**

1) In a high option society an extended educational system needs to be developed in which education employing mass media such as television educa



tion given within various enterprises and all other educational programs may be flexibly promoted

2) In a high option society school education must adapt itself as an extended school educational system in an extended educational system

3) In a high option society an educational system has to be devised to cope with the speed of growth and development of children and the rapid changes in society

4) In a high option society new educational methods must be thought out which combine education through patterns with education through reason ing

5) In a high option society education provided in higher education organs such as universities should not be confined to one curriculum but should be set up so that a wide range of courses can be selected and pursued

6) In a high option society neither students nor faculty should be restricted to one university but rather through the set up of a multi channel university system they should be able to move freely or be exchanged to other universities

7) In a high option society a multi channel international university system should be set up which will not be confined by frontiers between countries and continents

# HOMO-MOVENSE AND METABOLISM IN THE MULTI-CHANNEL SOCIETY

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## MOBILITY DISCOVERED

Over my long professional career associated with diverse aspects of architec ture and city planning I have thought long and hard in an attempt to somehow come to grips with and thereby to identify the undercurrents of forces that dominate this contemporary age of ours an age characterized by turbulent

The human individual is buried in an organized gargantuan society and reduced to a mere cog in its massive machinery There is no doubt that science and technology holds out the promise of boundless progress and makes available many comforts and conveniences of daily life But is the performance of science and technology dictated by a sovereign human will? The essential concepts of man as homo sapiens and homo farber may no longer be an adequate basis upon which to establish man s primacy in the new age that is about to dawn For the present age is undergoing flux too great and change too violent for man to be content with simply thinking or to derive satisfaction from simply making

I have finally reached the conclusion that there is a common focal point or a common approach to solution underlying a wide spectrum of constantly chang ing and intertwining problems This common approach is to ponder all the implications that the process of moving has for contemporary society In other words I have thus uncovered mobility as a new value for humanity

An example of this in the world of art is the Miliolam Movement of Group T that took place immediately after the war in Italy This was the group that tried to unfold altogether new meanings in art by interposing between the artist and the viewer an object in highly physical movement by for instance attaching a steering wheel an engine or a combination of two or more such objects to sculpture or painting It may be said that their thought was in the beginning similar to that of G Kalder who invented the movie

Furthermore the so called futurist group led by Boccioni Balrer Kalder and Saint Teria and others also attempted to foresee the future by focussing on the

speed and movement which are going to become increasingly noticeable in the future society

It may be said without exaggeration that these new art movements had the effect of repudiating the time honored philosophy that art is eternal By allowing an object and work of art to move physically or by imparting to them the move ment of birth growth change and decay the new movement destroyed the eternity of art but in so doing it tried to discover and gain a new relatedness between man and art

## METABOLISM ESTABLISHED

The same thing holds true in the world of architecture I have been working since 1959 with my group to develop a new genre of metabolic architecture Such architecture may be thought of as meaning that

1) It should anticipate the future
2) It should be structurally functional
3) It should assure multiplicity of choice
4) It should provide a place of time
5) It should have multi national acceptance
6) It should be methodically developed and based upon prototypes
7) It should reject integration with fine art and maintain a relationship of antagonism instead
8) It should be liberated from a clinging dependence on technology (the techniques of production)
9) It should be freed from rigid conformity to geometry and
10) It should more than being all inclusive embody partial characteristic

In short emphasis here is on distrust of the established ideas and techniques of modern architecture that had swept the world in the first half of the 20th century when the major human preoccupation was with making things and our resistance is also directed against the European spirit of rationalism unique to Europe

Did not that movement of modern architecture with CIAM (Congres Inter national de l architecture moderne) at its center seek its conceptual and methodi cal origins in the analogy with machinery?

Le Corbusier s famous Glowing City is an embodiment of his thesis that a house is a machine for living His methodology found concrete expression in the Athens Charter of CIAM which rigidly categorized the functions of a city into the three distinct elements of living workings and leisure According to the Charter that (passage) which connects these three functional spaces is defined as nothing more than connection between spaces as say a belt This is clearly revealed by a look at Chagandale (phonetic) and Brasilia which are considered showcases of the CIAM principles of city planning For example the public center government office area city center and residential area of Brasilia may be geometrically and neatly compared to the functions of a jet aircraft s fuselage and two wings

Contrary to their approach ours is to seek our analogy in the living organism



in that in contemporary society where everything is intensely flowing growing changing and proliferating nothing not even the city or its buildings must be conceived as an entity which by nature is subject to metamorphosis and metabolism In other words our approach is to grasp the city as a moving body which changes itself in terms of both time and space in response to the changes of society and the age What is regarded as the decisive master key (the method or a prototype) in our case is the system concept

Functionalism based on analogies with the machine dictates that a clear distinction be drawn between passages and buildings as two separate functions It even goes so far as to define the passage as a space alien to architecture and the antithesis of architectural space

However as will be noted later such a thesis fails to point to the essential nature of the passage The kind of new city and architecture that we must envision should not be just a massive receptacle in which to house static life It should be approached as system engineering or technologies with which to discover ways and means of expressing and organizing that substance of life that is undergoing great change as it enters the future It is therefore precisely this passage that best symbolizes the new type of city and architecture

The passage in this instance means more than just the physical existence of a road Instead this passage symbolizes a genuine human movement a transferring of things and energy and an invisible flow of information It is within the scope of this meaning that I earlier advanced the thesis that the design of city and architecture is to give shape to the flow of information and have made reference to the architecture of passages

## CHANGING VALUES

The environment surrounding our life is undergoing rapid change Our life pattern itself has steadily changed with the popular use of home appliances the kitchen being the part of house that has changed most since the War This is the direct result of technical progress The important thing however is the not simply change that technological innovation has brought about in our physical way of life but that which it has caused in man s sense of values vis a vis his newly emerging environment The benefits of such sweeping technical progress are ap parent everywhere not only in our home life but also as manifested in the New Tokaido Line the popular utilization of airliners and the sprawling expressway networks It is this change which is directly responsible for the rapid changes in the environment of the urban city and in the life patterns of its citizens

In the days prior to the start of the New Tokaido Line who could imagine that it would be possible to leave Tokyo in the morning finish one s business in Osaka and return to Tokyo to attend an evening meeting all on the same day? Equally unheard of were feats now possible like going out by car at 100 kilo meters per hour to some distant recreation area and then returning home the same day for a good night s rest

Indeed we have been witnessing extraordinary changes in recent years The New Tokaido Line has carried a total of 100 000 000 passengers in the four years time since its inauguration This number is equal to Japan s total popula

tion including even babies and the old Furthermore The New Tokaido Line s increasing popularity has brought out sharply the change that has occurred in public attitudes toward the New Tokaido Line since its early days The Super Express Kodama was at the outset publicized as a train catering to the travel ing need of businessmen yet that same Kodama today appears to serve a passen ger clientele not much different from that of an ordinary chartered train carrying groups of tourists The Kodama for all practical purposes appears to be a train that runs from the large metropolitan area of Tokyo to resort towns such as Atami full of groups of vacationers merrily singing drinking and eating their way to their destination This is quite a different picture from that original image of The Kodama as a more or less an exclusive kind of public conveyance serving business leaders

Only as recently as ten or twenty years ago these same people would likely have considered riding The Super Express a luxury and privilege reserved only to the people with higher social status Today very few people consider the New Tokaido Line a train that operates for the sake of a handful of the elite Instead they take it for granted that it operates for their enjoyment

That the credit for much of this achievement should be given in all fairness to such economic factors as the improved income level and a shift in consumer preferences needs no emphasis but even more important is the change that has occurred in the people s value consciousness A new search has begun into a different system of values previously unthought of and a different set of goals not previously regarded as worth exploring New value was thus found for instance in the experience *per se* of riding the Super express

Improvements made in the accessibility of airlines and automobiles has been even more significant The Statistical Handbook of Transportation Economy indicates that domestic passenger transportation by airline and automobile in Japan grew to 2 241 and 2 417 respectively from a level of 100 in 1955 Develop ment in transportation technology one might say induces improvements in the mode of life that eventually alter the substance of man s life and values

## BIRTH OF HOMO-MOVENSE

It seems that running through the violently changing state of chaos that engulfs city planning architecture art technology and life is the sturdy center called mobility around which everything rotates to form a giant social whirlpool What sort of new pattern of life and new value consciousness can be derived from it? I should like to call men in possession of such new values and life patterns Homo Movense

Mobility does not mean moving without purpose or being made to move by external forces Homo Movense are the people who try to seek their *raison d etre* and the supreme value of their action in mobility thereby securing proof of their existence In a relentless effort to move ahead toward the creation of a new future they rebel both within themselves and in their social action against every stereotyped idea and conventional establishment Such men will gradually lose interest in acquiring such real estate as land or large houses despite the fact that these are the highest social status symbol in the classic community



They will instead be more concerned with seeking a diversity of new values and goals of life suited to their individualities One such value may lie in the acquisi tion of the means and opportunity that allow greater freedom of mobility

This paper focuses on the question of the type of new urban space to be developed by the emerging Homo Movense

The rise of the Homo Movense provides momentum for the disintegration of the fixed gigantic and established social pyramid built by the advanced indus trial society and presages the advent of a new society of diversity

That is to say it opens the way for an entirely different society one that will not conform to the collective oriented thinking inherent in a conventional urban planning theory and commonly subscribed to by social administrative and business organizers a new society recognizing the individual s freedom to the maximum and providing a greater degree of selectivity The Homo Movense sig nals the individual s challenge to organization and the rebellion of individuality against uniformity

## PAN-URBANIZATION

The age of the industrialized society is marked by a confrontation between on the one hand the secondary industry the labor population and the support ing tertiary industry make up the urban society and on the other hand the primary industry and its labor population that form the agrarian society

In the age of the informational society the geographical division of urban vs agrarian areas vanishes and in its place pan urbanization pervades the whole nation The pan urbanization does not mean however the creation of a unified urbanization evenly covering the whole nation Rather it will have the effect of dividing the nation into groups of urban networks each specializing in a given set of functions

The existing metropolis will return to its prime function as a region of urban living to accommodate not so much working people as such as to maintain life itself in that information society based predominantly on tertiary industries Primary as well as secondary industries will begin an exodus out of the cities in search of adequate sites for relocation

Manufacturing industries have in the past converged into city areas to take advantage of such geographical advantages as in chronological order easy access to raw materials availability of labor and the suitable consumer market the latter being a positive inducement for the continued flow of industries into densely populated cities This historical trend may reverse itself with industries seeking other new relocation sites which are advantageous mainly for raw material acquisition There are two reasons for the reverse trend One is the requirement for stricter control of environmental hazards and the other is the need to improve industrial efficiency

The problem of public environmental nuisances has surfaced when the city has begun to undergo its metamorphosis into the information society Based on the premise that man is the information industry s raw material a circuitous argument about the sovereignty of man in the city is in fashion Though the subject is nothing especially new it is gratifying that such debate has been begun

Gone at last is the time when a landscape of smoke spewing out over an industrialized district evokes the pride of the residents They now react rather sensitively to the damage caused their environment by industrial plants and local communities are becoming critical of the indiscriminate manner in which they once tried to attract new industries The new realization of residents that the city is a place for human habitation may soon have the effect of driving manufacturing industries out of city

With regard to the question of industrial efficiency what are some of the major areas that tend to create problems?

One area that is prone to problems is related to the new direction in which the industry is likely to move henceforth namely conglomeration capacity expansion and business complexes Industries heavily dependent on overseas resources like steel and food processing need good ports with adequate facilities to handle imported materials in vast quantities in order to reduce freight costs The petroleum industry has already coped well with a similar situation It has constructed and put into regular operation 300 000 ton tankers and the trend is for building even larger tankers Similarly for hauling such other materials as steel lumber and foodstuffs positive use will be made of super large carriers Existing port and harbor facilities at Tokyo Osaka Kobe Nagoya and Yokohama are however inadequate for accommodating such super carriers Several massive industrial ports need to be built at strategic points on the Japanese archipelago

Such ports do not necessarily have to be built in coastal area for it is quite possible as a future project to construct unloading facilities in the form of floating marine ports a few kilometers off shore to improve their efficiency

At any rate industry will move out of cities to look for new locations with advantages different from those of existing cities so as to build huge industrial complexes The effect of this trend is that a single unified industrial complex will be established in one locality containing in itself a totality of integrated operations from primary manufacturing industries to secondary and tertiary industries At a food processing complex for what for example the entire processes from the unloading and storing to milling and baking and processing into corn starches and animal feeds will be laid out as one integrated operation In this case there will be a marked gain in efficiency as compared with conventional practices in which flour once milled and packed into sacks used to be shipped to secondary processing plants all over the country Furthermore the new formula of integration will enable inventory and production control to be systemized

## DAY CITY

The trend that may be called the shift from a day city to a night city will be another major development associated with the age of the informational society According to a modern city planning textbook the population density and building height of a city go up in proportion with the proximity to the city center very much in the fashion of the spread of a mountain s foothills The same rule of thumb applies to the relative social height of classes higher toward the center and lower in the outskirts Characteristically a suburb starts where



a city line ends and gradually sprawls into a farm area This pattern is in evidence to be sure in many of the world s large metropolises including Tokyo These cities were planned with a belief in the propriety of the pattern

The idea of Green Zones in urban areas however deserves a closer look It was conceived as a countermeasure to prevent the population from reaching the explosion point in the city The green zone that bans the urbanization of suburbs was intended to check the city s expansion before it reached mammoth proportions The actuality is however as was the case with the National Capital Region and local areas all over the country that many of the green zones have turned into slum areas over congested with illegally built buildings What happens in the green zones or open areas where the permitted ratio of building coverage is held very low is that no sooner is land acquired cheaply than a home is build illegally covering the entire area of the lot

A factor of decisive importance is the real value of the land or its locational advantages which as a matter of fact have very little to do with geographical distance to the city center The length of time required for commuting to the city center is more important than the distance Of two residential areas of residence one at the far end of Setagaya Ward within a 15 kilometer radius of the city s center but requiring one hour of commuting and the other with a 30 kilometer radius but requiring only 30 minutes of commuting the latter is definitely more advantageous for its shorter time distance

The use of the time element in determining the convenience and advantage of a particular home site makes its location as expressed in terms of so many kilometers from the center of the city meaningless as a measure of its value in a large metropolis

Also the completion of more highways and super express railways on a nation wide scale will promote dispersion of the population to suitable living communities all over the country irrespective of their geographical proximity to city centers Such nationally dispersed communities will eventually be come interlocked to constitute a nation wide network of communities Thus the relative worth of the city function will be determined not so much by the size of the night time population (the function of where people live) as by the size of the daytime population (the function of where people are in the daytime) A city thus linked to detached residential communities is called a network city

## CITY AS INFORMATION CENTER

The proper role to be played by existing metropolitan cities within this definite trend toward a national network of urban communities will be in my view that of the information center

There is no question that developments in transportation and communication technology will lead to the liberation of the people from the need to live in a large metropolis with its polluted environment It will also enhance the opportunity for closer human contacts the increased availability of all types of communication devices making it possible for people to meet directly more frequently and readily than ever before

Granted that the greater accessibility of picture telephones to the general

public will reduce the need for face to face meetings for those people who have ordinarily been in touch with each other at best by the exchange of New Year s cards the picture telephone may serve as a strong incentive for more direct meetings After all human nature being what it is the closer people remain in touch the warmer are the feelings of affinity they develop

It is therefore likely that people will come into the city more frequently in the daytime even though not living there at night to meet discuss confer and exchange information In this context the city as a place for the activities of the daytime population will steadily gain in importance

Of the vast information that exists what is termed sign information consists of such knowledge and information as manufacturing instructions stock control records financial reports and news that can be exchanged bought and sold by a means of communication

The problem is with symbol information such as education recreation art debate and planning which does not easily lend itself to electronic processings because it does not possess the uniformity that is mechanically disposable Symbol information is that information that is exchanged amplified and com municated in a creative manner based on man s innate and multiform individ uality

Education is inconceivable without the mutual contact of human hearts New ideas are created as a result of the mutual clash between opposing con tentions and personalities in debate and planning not to speak of art In fact the most vital function of the large metropolis in its role as an information center is indeed to facilitate this creative exchange of information The reasons for the inevitable concentration in large cities of education research broadcasting and publishing as well as the planning control and sales functions of businesses are that the larger the city and the higher its population density the greater the chances of man to man encounters and the closer the contacts between human minds

Those establishments of the large city that are now changing with the greatest rapidity are department stores transportation terminals hotels plazas shopping streets and universities As Mr Michio Nagai put it a department store is like an adult s college Not only that university classes are now conducted so close to downtown areas that department stores function as something of a teaching institution hotels offer places for discussions negotiations meetings conventions and recreation in addition to their immediate service of lodging and railway terminals have turned into plazas for public gatherings Thus these are slowly changing into establishments with multiple purposes and functions The city is not only a housing region It is also a plaza a shopping center a railway terminal and a university This is the information city

## COLLAPSE OF COMMUNITY

Any discussion about metamorphosis of our own selves requires that at tention be first directed to the question of community thus far regarded as the minimum unit of a living place

What is a community? This is a term in practical as well as academic frequent use but its meaning is not necessarily very clear The scholar G A Hillary once collected 94 definitions of the term with only this as a result I could find no full consensus with regard to the exact meaning of the term community

Precise definition of the term aside however the word usually has the follow ing two meanings sometimes intermixed

First it is predicated on the assumption of specific domain that is the con cept of locality or place is inseparable from community

The general consensus is that a community is a highly insular group This is quite a natural assumption in so far as community is equated with a domain Most typically this is the community in which members daily lives are accom modated much in the fashion of a feudal farming community

Second community means a specific social group of distinct integrity which makes it characteristically different from other groups A social group integrated on the basis of a spirit of unity by virtue of its members common background of birth and religion is called a community

The two meanings cited above are expressed by L P Abercromby s definition with regard to a community of plants as a unit of plants occupying a given area and showing shape distinct from other plants

Community is also frequently used in the context of city planning as com munity planning and contiguous residential district planning The community here means a cluster of outlying residential districts each of which has a popula tion of 5 000 to 10 000 and its own school stores and other public facilities The community planning in this case is such that each component residential district is laid out complete with housing stores school hospital and park

Most of Japan s postwar public housing projects were designed to accom modate tenants at most Calculations as to the numbers of stores and building areas for public facilities needed to serve a particular size of tenant population were made on the assumption that the tenants would live self sufficient lives with in such housing projects These stores and public facilities were then constructed in the central area of the project The technique has also been developed out of the concept of community planning of combining several of these sub center housing projects to give shape to a single consolidated living community The Senri New Town constructed after the War is an actual example of the applica tion of this community planning principle

Another typical example embodying similar thinking is the New Town planning of London There the planning has been carried forth with a view to defining and building into the community all those functions needed to allow the tenants self sufficient lives The planning was based on the thinking that the physical spread of the community matches or should match the living scope of its residents

This kind of community theory has evolved as a matter of fact out of Europe s traditional city planning A European town is laid out basically with a square at the center the public area of church city/hall and market place immediately encircling the square and residential areas in the outskirts of the city A larger metropolis is also built within this basic framework with additional squares added on at the perimeter each of which is in turn surrounded by residential area People in the peripheral residential community centering around a square are able to live self reliant lives on a 24 hour day basis Community planning

principle such as this were bound to lead to the institutionalization of that square centered functionalistic structure of the city singularly peculiar to Western Europe

A static domain closed to the outside with its member residents living self sufficient lives within—that is picture of the classical community Does such still have a place in today s modern society? The answer must be no In the first place progress in transportation and communication techniques have broadened the arena of human life This fact has been clearly demonstrated by the results of surveys made of the housewives patterns of time consumption and shopping in large public apartment complexes While there are sufficient numbers and varieties of stores recreational areas and public facilities in their housing proj ects these having been constructed in accordance with careful advance planning taking into account the residents total needs these housewives however have with increased automobile ownership for one thing begun to prefer outside shopping and recreational facilities reflecting to their own community facilities

Additionally another problem of a more basic nature has arisen in that the average duration of settled living in one location has become shorter

During the days of the classic community a family lived at a given place over many generations As a consequence a feeling of attachment about inherited settlement was cultivated and carried down from parents to children and then to grandchildren and this vertical attachment meshed with the horizontal ties of association that ran across the entire community to create a spirit of unity among its resident members As is evident in organizations tied to Buddhist temples and their supporting families or villages founded by tutelar gods and their protege custom that has been handed down from one generation to the next is the nucleus of community that binds together all the people inhabiting the community

However many of the present residents in the mammoth housing projects were virtually compelled to move there because of the housing shortage What kind of community are these people to envision living as they do in this artifi cially imposed social group with no common ties of traditional custom or kinship to unite them?

Theirs is life in an expanded arena too large to be confined within the com munity that is traditionally assumed to exist

I am not referring merely to the practical impact of the greatly increased automobile ownership or the fully developed direct dial telephone networks I am referring to that arena of life and activity that demands larger spaces In other words contemporary life has literally burst out of the existing confines seeking an expanding space of area which is beyond control of conventional urban community planning Without such spatial expansion life is simply no longer sustainable

The annual mobility rate of an urban city in the United States is reported to be 25% of its total residents This means that there will be a complete turnover of the residents in four years time This fast population turnover obviously stands in the way of maintaining that unbroken inheritance over many genera tions of those community customs which once constituted the vertical axis of unity It has also put an end to that *esprit de corps* and community mindedness that served as the horizontal axis of union



Multiplication and diversification of the values and goals available tc man have also helped accelerate the collapse of community

In the days gone by an individual person born to become member of a society knew the rules by which to abide The standard of values he had to comply with was clearly definable a landlord s son lived as a landlord and a sharecropper s son lived as a sharecropper Some remnants of similar rule still persist at present as for example in the boss underling relationship and in the very personnel relationships of a Japanese business corporation

However life in an open society enables an increasing number of people to act with more and different patterns The pattern of obtaining satisfaction out of life will be different as it will be related to the greater freedom to choose their preferred values from among many alternatives Even though public facilities and shopping places in a given housing community may be numerically ample the residents will still go beyond their boundaries in search of a greater number of choices elsewhere The same thing can be said of the diversified choices of educational and recreational facilities available

This trend has nothing to do with the drastically shortened average period of residence in one place It remains valid in that regardless of the difficulties of resettlement they actually began to move out their confines to avail themselves of wider ranges of choices

Of course the traditional community can not exist under such circumstances In America for example the only concepts which may at present be capable of creating community are the education of children and segregation to protect class positions Graduates of Harvard University with family and social status are strongly inclined to reside in the same area as their married classmates in order to preserve their class status by association with their peers They go to the great pains to maintain the identity of the area in which they reside as distinct from others As regards the racial matter they would even demonstrate their determination to protect the identity of their area by moving out of the area *en masse* should someone else with a different racial background happen to move in

The development of suburban residential communities is often the result of the movement into these particular areas of people motivated by a desire to send their children to a school attended by children from good families These examples are typical of the kind of community that still remains in America and England in a way interwoven with the existence of social classes We see here an example of the enduring tradition of a European type community in the United States despite the tendency for communities to wither because of the modernization of cities

Does a similar trend exist in Japan? Was there ever a time in the history of Japan in which a true urban community was developed?

During my boyhood I often came across home in the city and in the suburb with a doorplate that read *GU* of so and so These can still be found today I learned from my father that GU means temporary residence but often wondered why such fine houses were called temporary homes

The scholar Kunio Yanagida explains that the Japanese concept of home is governed by the relationship of between the main house and the temporary abode The main house is considered a place in which to worship of the gods

and ancestors as well as a place of residence in which family traditions are preserved while the temporary house is a place of work These two houses are held to be quite separate and distinct from one another In Nagano Prefecture for example the main house is located on a flat land but the temporary house is a cottage built in the mountains and used as a place of work and the trip back and forth between the two houses symbolizes the dynamism of life

The same principle was applied in its unalloyed to the modernization of Japan Since the outset of the movement in the Meiji period for the accumulation of national wealth labor requirements in Japanese cities have been met mostly by emigrants from farming villages who moved to cities in response to the demands of the labor market Unlike the situation in Great Britain where capitalism fully blossomed Japanese urban labor always had one foot remaining in the farming villages so to speak and the semifeudal landlord establishment was in a position to absorb surplus labor whenever the need arose It was precisely this situation on which the low wage standards of Japan hinged This also proved a great advantage in Japan s industrial modernization

This subject is dwelt upon in some length in Mr Kazuo Okouchi s well known theory of Migrant type Labor Thus the city in Japan represents an area of work away from home and was looked upon as a temporary residence As opposed to this attitute toward the city the rural village always remained one s native home Although the traditional image of the village as one s native home has lately disappeared primarily on account of agricultural land reforms carried out twice since the War and the subsequent population exodus caused by continuing urbanization a great many people who have been city dwellers for a generation or two still harbor somewhere in their hearts a nostalgic feeling for their native village in the country This is as it should be for they are not yet free from the deep rooted feeling that the city is only a place of temporary residence

A survey conducted by the Sociology Department of Doshisha University at the request of six of the largest Japanese cities (excepting Tokyo) on citizens mentality was intended to measure the intensity of their residual feelings toward a home town and the degree of modernization of respective cities as reflected on the respondents attitude of mind The survey showed that in every city 70 to 80% of those questioned have strong feelings toward their native communities and in fact over 90% of them actually have homes in rural villages

These native villages are synonymous with those farm communities united by the sense of commonality of the members stemming from their sharing common ancestors and land This real meaning as such however has been all but lost Still it is interesting to note that the city dweller is still oriented to the concept that the city is to a large extent a place for temporary employment away from home

The urban community has its origins in that European bourgeois which came into prominence during the transitory period of several centuries between the collapse of the medieval agricultural society and the rise of the modern industrial society The bourgeois succeeded in achieving strong ties of common bondage through united resistance to win their rights vis a vis the medieval feudal lords and despotic monarchs which feelings later developed into the nucleus of the new communities they established The American community mentioned earlier



definitely has some residual characteristics from the European type of community

The question often asked in Japan in this connection is that of how it is possible for such a European community to take root in a society in which the bourgeois did not play an eminent role in the modernization since the Meiji Restoration

As earlier pointed out Japanese society is not prone to accept the permanent establishment of an urban type community This is an indisputable fact as is the fact that the rural type community has already declined What is going on is that as the range of human living has broadened the man s selection of values and goals has become exceedingly diverse

Gone is the time when man s social status is judged by the degree of his permanency In the contemporary information society his social status is better expressed by the extent of his multi selectivity and multi mobility The quality and quantity of information he has at his disposal will be improved by such factors as his ability to go to places where ordinary men can not go and to meet people there

This being the case our conventional concept of the urban society as basically stationary and insular must be drastically overhauled

# VALUE IN LEISURE LIFE

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Man lives in a variety of evaluation systems Man evaluates in various ways his age his relations with friends politics women s fashions etc These evalua tions in aggregate constitute man s attitude Leisure has its own place in these evaluation systems According to Webster s dictionary leisure is defined as un occupied time during which a person may indulge in rest recreation This paper s aim is to discuss the place which leisure is to have in the future society

## FUNCTION OF FRONTAL LOBE OF THE BRAIN

According to neuro physiologists suicide is a phenomena unique to man alone All creatures other than man depend upon instinct for most of their behavior The frisking of puppies or kittens though very pleasant to watch has been proved by many observers to be not mere play but a type of behavior deeply rooted in their hunting instinct Some time ago a cameraman from a certain broadcasting company filmed over an extensive period of time the life of a fox family In this film a baby fox is seen to frolic with any animal that comes near say a hare But as it grows and its hunting instinct becomes stronger the hare will become its prey As this example indicates animal behavior no matter how innocent and play like it may appear to be is understood to be the training for survival which nature orders

A well trained monkey can become skillful enough to perform highly com plicated and advanced acts However it is literally a monkey of a monkey showman motivated to perform only by its instinctive desire to obtain food

Anatomically speaking man s difference from other creatures lies in the fact that man has a frontal lobe in the brain while the others have not The function of this particular organ is to infuse in man a sense of will That being the case it may be said that it is because of his possession of the frontal lobe that man is able to engage positively in play for the sake of play itself

It is said that what made man depart from other creatures and build civiliza tion was his possession of the frontal lobe through mutation It is therefore

fair to say that the origin and progress of man s play coincide with those of human civilization In fact this can be traced in the old stone age caves on the walls of which the ancient people drew wonderful pictures These splendid artists not only tell us today how people of their age lived but also teach us the types of man s most ancient pastimes

All the historical vestiges retain traces of the patterns of leisure life which the people of the respective ages used to lead and it may even be possible to review man s history primarily from the angle of leisure and play Today we can to a certain extent actually observe different cross sections of such history in the lives of uncivilized peoples There we may discover many patterns of play in common with the more civilized parts of the world such as singing dancing fortune telling parties and games of different kinds

For these uncivilized people as well as for those of us surrounded by the wonders of modern science life is not easy In order to meet the hardship of life and continue living it is necessary to have some purpose of life Although the frontal lobe has given man civilization it has also given him the option of killing himself This is why man needs a motivation in life that is totally unknown to other creatures

A child whose frontal lobe does not yet control all of his behavior does not always need particular motivation or purpose in life But grown ups whether consciously or not need their own systems of purpose in life which make them hope for tomorrow or despair of the future as the case may be While it is desirable from a humanitarian point of view that an advanced system of social security should protect the aged it should also be noted that there is a higher suicide rate for old people in those countries with more developed social security systems This shows eloquently how important it is to have a life purpose

Man is no ordinary creature The frontal lobe of the brain which is nature s most wonderful present to man has been the driving force to civilize human society and make it rich and abundant But on the other hand it has also posed for him the serious problem of how man should live a problem entirely unknown to other creatures

## SOFT-STRUCTURE SOCIETY

The modern society is efficiency oriented The capacity to do a job at lower cost with less labor and material and at a higher speed has made modern society rich In other words this is the question of productivity

Improvements in productivity among nations after World War II have been remarkable indeed The development of a series of engineering devices including feed back mass production and computers which originated back in the days of World War II and whose success is literally worthy of being called technological innovation has greatly contributed to the enhanced productivity of not only individual corporations but also the society as a whole This trend is destined not to be reversed but to be further accelerated All of this has resulted in a somewhat paradoxical reality in which per capita income has been increased while working hours have been shortened

Under the circumstances the principal means of creating value has shifted



away from manual labor to machinery and from machinery to man s knowledge and wisdom which creates that machinery

The power of a nation used to be measured by its geographical size and population Today it is measured by its industrial capacity Productivity is now a symbol of national power for affluence is brought about by high productivity Although some people even today attribute the wealth of the United States to her vast land and abundant natural resources this is obviously mistaken Switzerland with practically no resources and with only limited land is the second richest country trailing only the United States because of her industrial capacity On the other hand there are countries with vast land but poor economies Many of the developing nations fall into this category Therefore it is most appropriate to call the modern society an industrial society

What kind of society will emerge out of this industrial society? It is certain that in the forthcoming society productivity will be further improved and working hours will be greatly shortened Moreover a highly systematized and efficiency oriented type of labor will then be required It will be a tightly administered society in which individual free will is further sacrificed for the sake of organization

Even today we can see prototypes of such society in an automated plant or the cockpit of a jet airplane To most of us the sky appears to be the freest of spaces But in the eyes of jet pilots the sky is but a highway for a minutely calculated flight plan which it is their duty to carry out Here is not even a trace of the romantic flight by Lindbergh Everyone takes it for granted that pilots should carry out their pre programmed flight plans faithfully No deviation is allowed for the kind of accidents caused by such deviation is just beyond the imagination Unwitting carelessness could destroy a machine worth billions of dollars and take many invaluable human lives

At the ultimate of such a rigid society we have computers for computers never err Since they are absolutely incapable of doing anything they are not taught the man who uses computers is not allowed to make mistakes Recently computers have been demonstrated which play chess or perform what appears to be play but this is nothing more than the output of what has been taught to computers They are not acting on their free will For the present it is only man that has a frontal lobe in his brain

It is indeed ironic that while the frontal lobe has created a highly rationalized society the net result has been a very rigid system symbolized by computers More than being ironic it would seem to beget various dangers It is against this background that the proposal is made to introduce a soft structure to our society

Generally speaking a highly efficient precision system is operational only when it has an aggregate and simplified purpose A flexible multi purpose system is not easy to devise For example pollution which has recently aroused public concern is the result of a system of production which has the highly rationalized and simplified purpose of lower cost and better quality and which is programmed in complete disregard of other considerations Certainly plants and equipment are efficient under such system but once successful they tend to be further expanded in order to achieve greater profits Man s attempt to work on nature destroys nature s balance Soon it will be impossible to ignore the extent of this

imbalance Even the exhaust gases of jet airplanes flying high in the sky have become a social problem The inventor of the jet airplane probably never even imagined that its exhaust gas would become an object of regulation

It is not only nature that is polluted As the number of men on earth is very small compared with the scale of all of nature the hazards to man are likely to become more obvious and serious This brings about the need for recreation to restore man s humanity Namely this is the question of how to deal with that leisure which tends to become more abundant due to greatly shortened albeit more intensive working hours and how to utilize it for restoring humanity This is because leisure increases the entropy while labor decreases it

## FOR INCREASED ENTROPY

In the preceding discussion I have had more or less the individual human being in mind The need for increased entropy however can be said to apply equally to human organizations such as nations and corporations At one time nations were eager to maintain their positions in the world and to survive the struggle among them However the world is at present moving toward the system of collective security and it is contended by some that the likelihood of total war which is now an obsolete pattern of conflict has become very small

It is against such a background that activities to increase the entropy on a national scale have recently become fairly noticeable Exchanges of sport activi ties with the Olympic Games as their crown are examples We can readily imag ine how Abebe s victory in the marathon race in the Olympic fired the whole nation of Ethiopia with enthusiasm and how it stimulated the emerging nations of Africa One of the super deluxe leisure activities engaged in by nations is space exploration Although some criticize the success of the Apollo 11 pointing to the fact that there are still many starving on the earth a glance at the course of human history will show how many of the fruits of today s civilization have originated in such full scale leisure activities The success of the Apollo 11 must have reminded many Americans of the frontier days and given them a deep sense of irrational happiness Exploring the Arctic and the Antarctic or climbing Mt Everest are still other examples The sense of achievement brought about by these activities typifies the kind of value of leisure life value which cannot be measured by money Essentially this is a mental value the result of the message of the cerebral embrace that does not allow comparison with any other value

Some praise the success of the Apollo 11 for the resultant diffusion of tech nology developed specifically for this project But this is but hindsight worked out to justify the project because if the diffusion effect of technology were the purpose there would have been other better means More aptly the Apollo project should be evaluated as a super deluxe leisure activity of the present age

In connection with the Apollo project some people have been heard to quote the words of Malory who died in an accident while climbing Mt Everest that I climb it because it is there These words show the essense of what the Apollo project is supporting the validity of my above remarks

Usually objective criteria are available for the evaluation of efforts to decrease



the entropy such as cost product quality and productivity In contrast to this activities to increase the entropy are evaluated subjectively on the basis of things mental and emotional The evaluation of the Apollo project mentioned above is indicative of this These thoughts lead me to the impression that the old aphorism that the essense of human activities lies in the pursuit of the true the good and the beautiful is another way to describe the nature of leisure The significance of the Apollo project has a great deal in common with man s pursuit of truth goodness and beauty

Probably from a moral point of view activities to decrease the entropy have been regard to be basically commendable while those to increase it have been viewed as mere waste and therefore condemnable This value system however is being lost among the contemporary youth Particularly today when produc tion depends less and less upon man s physical force the need to waste what is produced has come to be greatly emphasized

While we have today an organized effort for research into more efficient production no such organized research is conducted in the field of increasing the entropy With only very rare exceptions this is still in a completely un developed stage Some time ago I investigated the kinds of leisure activities in existence today and found much to my surprise that there were very few invented and made popular after World War II (Incidentally this investigation classified leisure activities into approximately 200 patterns Among the oldest patterns of leisure activity is the quarrel between man and wife ) It is in these facts that there can be found the evidence of an absence of any organized activi ties to increase the entropy

## DIVERSIFICATION OF LEISURE ACTIVITY

One of the important conclusions drawn from the preceding paragraphs is that the basic difference between leisure activities that increase the entropy and those activities that decrease it lies in the ways in which they are evaluated While the latter are usually subject to objective criteria the evaluation of the former is basically subjective Another conclusion of consequence is the absence of any organized effort to develop new types of leisure activities

It is often pointed out that an informational society will emerge out of the industrial society of today In the industrial society value is created principally by industrial power and in the informational society information will be a value of central importance As far as information is valued only by man this will be the kind of society in which man is restored to a central position in the value system

The major hardware of the informational society are computers and com munication lines If we can make clever use of these devices it will be tech nologically possible to realize a society with diversity The principal characteristic of the present industrial society is no doubt the system of mass production This system whose first steps for success were initiated by Henry Ford dramati cally enhanced productivity and made highly industrialized goods available to almost everyone But it is also a system that demands conformity In this sense the industrial society is a society of conformity

Things will be drastically different in the informational society for computers can produce diversity at much lower cost Already the popularity of Ford s Mustang has indicated such a trend Man wants diversity Interestingly it is in the field of decreasing the entropy that the first move toward diversity was witnessed Now this new wave is spreading to almost every field of production and sales Department stores have already begun preparation for diversified sales by processing data on each individual customer Although some people may resist such a trend on the ground that it would tightly regiment individuals it is not without its positive side in that it is capable of respecting individual tastes and differences At any rate the highly selective society has already emerged in the entropy reduction industry But it will definitely be in the entropy increas ing industry where this policy of diversification will have revolutionary impact

No two men are alike Individuality is what makes man I have emphasized that the evaluation of the increased entropy is subjective but I should also point to the fact that we are now approaching a society in which individuals can have their own senses of fulfillment and satisfaction

What is satisfaction? It is a kind of information A sense of satisfaction therefore can be secured through the development of engineering devices such as computers that process information In the entropy reduction industry significance is accorded the production and fabrication of materials or energy However in the field of leisure waste of materials or energy is a means or an agent to obtain a sense of satisfaction and achievement For example a pilot can have an almost real sense of flight in an advanced simulator without actually flying The Apollo astronauts were trained in simulators which gave them a feel ing exactly identical with space flight The Apollo 8 astronauts reported during their space flight that everything was exactly like the training

This is indeed very noteworthy Although their flight to the moon was the very first such experience for mankind they were trained for this unknown trip even before they had the slightest experience with it I think this suggests the limitless possibilities simulators have in the field of leisure activity

These days leisure related industries have become a coveted target of invest ment But this industry today does not even attempt to transcend the realm of ready made leisure What little we have of novelty is either the application of the modification of technology developed for other purposes Development of and investment in the industry exclusively committed to the increased entropy are yet to come

According to one school of thought the future is not a thing to be predicted but something to be created I have the feeling that this view of the future is prepared particularly for the future of leisure activities Still the yet unanswered question remains as to who is to draw what kind of design on this blank canvas

# REDEFINITION OF HUMAN POTENTIALITIES

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## REDISCOVERY OF MULTIPHASIC PHYSICAL PERSONALITIES

Man is constituted of spirit and body and performs daily functions as a life Although characterizations of living bodies vary depending upon one s stand point one way to characterize them is that

i) They take the form of individual independent units
ii) They grow through metabolism
iii) They perform creative functions and
iv) They pass genetic information on to succeeding generations through death and multiplication

It is not only that they are independent as individual units but that there are no two units that are identical with varying degrees of difference between them

Mental differences between human individuals have long been recognized since ancient times but it is only recently that physical differences between individuals have been made clear

Rough standards were utilized to understand human anatomy and physiology in medicine that dealt with human beings That is to say there was a certain degree of recognition of the differences between individuals of different genera tions as between adults and infants but those of the same age brackets were dealt with in common in anatomical and physiological treatments

Basically medicine treated patients as divided accordingly into several groups and diagnosed them on the basis of symptoms common to the group using common prescriptions and common therapeutic methods

Some experienced and wise medical doctors intuitively became aware of anatomical differences between individual patients and differences in their reac tions to medicines Since they took these differences into consideration in treat ment they were respected as skilled doctors

Recently however as medicine has become more established as a scientific discipline and knowledge has advanced distinctive physical differences between human individuals have become known

The fact that no two individuals have identical finger prints of all the ten fingers is utilized in legal medicine for identification purposes

This also holds true of blood types Human blood is classified into the four types of A B O and AB But as blood type studies advanced further classifica tion of blood subtypes is now made into MN types and so and on As a result it has become clear that there are no two persons in the world who have identical blood types

Recently this has been theoretically substantiated by advances in genetic biology

The genetic information that determines individual personalities is carried on 46 sex chromosomes The important constitutent of the sex chromosome is DNA has the four organic bases of T C A G and determines combinations of amino acids to make protein

According to Mr Tokuhiro Shibatani if it is assumed that an average of 500 molecules of an amino acid are in one molecule of protein 500 molecules of 20 kinds of amino acids $20^{50} = 10^{650}$ kinds of protein There are $6 \times 10^{23}$ mole cules in 1 mol while the total number of atoms in the whole universe amounts only to $10^{79}$ The time elapsed since the galaxy system came into being is $10^{18}$ seconds and if a calculator capable of counting 1 000 per second kept count of the number of atoms existing in the entire universe since the creation of the galaxy the present total would come to $10^{100}$ In another words the possibility of $10^{650}$ different kinds of protein is of such enormous magnitude as to tran scends any standards in biological history dating back to the creation of the earth

That is to say there have been no two human beings since mankind s creation that have had identical properties physically as well as mentally

Moreover these human individuals are endowed with the ability to distinguish themselves from others and refuse to admit living tissues from other individuals This is the rejection reaction that occurs in the organ transplantation Therefore the difficulties involved in this rejection reaction derive from the very nature of human organisms as independent and individual units of life

If each human is unique as an individual unit of life then he has his own information that is different from that of any other—distinctive unique and important information that a life has as it exists in this universe

As a matter of course the belief has arisen that these informations should be made known put to significant use and then made a common asset to be shared by the whole society of mankind Hence the respect for the individual

Once this uniqueness and significance of the individual human being is under stood the individual freedom of choice—including the freedom of refusal—is expected to gain in importance in the future In view of the human right to spirit ual freedom and with the physical uniqueness of the individual human being proved medically the future society is expected to diversify and to allow more multi channel value standards to co exist

## INDIVIDUAL FREEDOM AND ITS RELATION TO SOCIETY

The fundamental demands of human beings for individual freedom and



equality have been held as a moral conflict throught the history of the develop ment of the human society

It has been a difficult problem to keep freedom and equality in harmony in every society whether based on liberalism socialism or democracy In reality one has been favored at the sacrifice of the other

These conflicting demands for freedom and quality are expected to be em phasized in the future society Therefore one of the biggest problems futurology has to deal with will be that of how to keep these two conflicting demands in harmony within the relations of all mankind

In order to find a solution to this problem the fundamental problems that are concerned with the individual s happiness and reason or purpose for existence have to be considered in relation to all of mankind and their solutions call for a philosophical or religious sense of mission that leads to common con sensus of the majority of human beings in the world In this sense the period from now on into the 21st century will be an era of philosophy or an era of religion

Reference has just been made to common consensus of the majority of human beings but preceding that is another big problem of whether or not man is endowed with an intrinsic sense of ties and cooperation with others Should there be an extremely large number of very individualistic people it is doubtful whether or not the society as a group of such people can sustain itself

Instead of dealing with these big problems a few technical methods to keep societies with multiple value standards in harmony are presented here

**Harmonic approach as seen in benign tumors** A malignant tumor that is a cancer continues to grow and assert itself in complete disregard of its environ ment until it destroys the total human organ system

On the other hand a benign tumor forms a larger tumor mass than a cancer affects a set area and is of course an unpleasant presence While it restricts the behavior of the human organ as a whole to a certain extent it does not give destructive damage to the growth of the total system

In other words a benign tumor asserts itself but in its relation to the total system it exists in harmony without destructive damage to other individual units of the total system The basic model for a harmonious society for the future is a society where individuals assert themselves freely only within certain limits so as not to destroy the total system while recognizing multiple value standards

Namely it is a society where a set of rules is established to prevent the benign tumor from becoming malignant while the presence of benign tumors them selves is allowed

The conditions required for such a society are that

a) The size of the society as a whole become so large as to make the presence of benign tumors negligible
b) The structure of the society as a whole become soft and flexible as live tissues and
c) The society be so structured redundantly as to have buffers to absorb conflicts

These conditions are not completely impossible in view of the future developments of economy and technology

**Approach to gain immunological resistance** When viruses and other foreign objects come into a living body the preventive mechanism is set to work and creates antibodies This is a biological mechanism to protect the multiplication of bacteria and viruses keeping the body unharmed

However if bacteria come into a body in too large a quantity at a time the body can be destroyed before a sufficient number of antibodies are produced On the contrary if the amount of bacteria that come into the body is too small, antibodies are not produced In other words the development of antibodies requires an appropriate amount of bacterial stimulation In a healthy and living body there is a greater possibility that more effective antibodies will be produced

In the future society there quite possibly will be harmful elements among its individual members Then in anticipation of this inevitable mixing of harmful elements it is necessary to develop immunological resistance by introducing into the society a handful of harmful elements in advance on society s own initiative In other words with the constant presence of small dangers the society as a whole develops a resistance to large ills This is a measure that is also effective in keeping frustrations under control before they reach unmanageable proportions by providing them outlets while they are still small

There arise here the questions of what harmful elements will be who decides that they will be harmful and by what standards this judgement will be made

In order to determine specifically how these small ills may by introduced into the society although the ways and means depends upon the society into which they are to be introduced an answer must also be found to the question of how small ills are anticipated and controlled to prevent them from doing major damage before society develops to resistance

The preceding has been concerned with the rediscovery of individualistic personalities of human beings and their freedoms and the following shall consider the improvement of human potentiality

## SYMBIOSIS BETWEEN HUMAN BEINGS AND MACHINES

There are two aspects to the improvement of man s physical capabilities quantitative improvement in the form of the extension of longevity and qualitative improvement in the form of a fundamental reconstruction of human beings

The extension of longevity is the immediate objective of modern medical science and there are being developed for that purpose new drugs and medical instruments adaptations to new environments organ transplantations preventive medicine and measures to combat public health hazards

In addition there is being newly developed a future medical science—the medical science of human reconstruction—which is based on a concept completely different from the traditional medical sciences In this respect there are firstly artificial organ systems which achieve symbiosis between human organs and these artificial organs and secondly genetic engineering that manipulates herditary genes to promote artificial evolution of human beings



Artificial organs are divided into the following four groups in terms of degree of perfection as substitutes for organ functions size compatibility etc

First group those that continue to function as substitutes for more than ten years after they are transplanted such as artificial blood vessels and artificial bones

Second group those that are already capable of functioning as substitutes for a long period but are larger in size and placed outside of the body Efforts are being made to make them smaller in size This group includes artificial hearts and artificial kidneys

Third group Those that are capable of functioning as substitutes only for a short period of time such as artificial livers

Fourth group those that are now being developed such as artificial uteruses

In the future these are expected to function as substitutes for original organs for decades and to become smaller in size and portable and all of them will be transplanted into the body Only then perfection of artificial human organs will be achieved

Artificial blood vessels are listed as nearly perfect in the above but to be more exact they can hardly be said to be perfect This is because there are as yet no artificial organs to substitute for the small arteries or veins in which the flow of blood is slow

This is because blood clottings are formed in the inside surface of the artificial blood vessels where blood contacts the artificial materials

The human body rejects artificial organs that are not its own as it rejects the organs of donors In other words the symbiosis between artificial machines and living bodies is extremely difficult

Due to improvements in the techniques of stitching blood vessels artificial blood vessels can be successfully connected to big arteries in many cases However even in those instances unless the connection is done in under optimum conditions mis matching occurs and artificial blood vessels burst In these symbiosis attempts more trouble is experienced in man to machine interfacing

In this interfacing and exchange of informations must take place and so the comprehensive control of operations as a total system is required

A human receives multiple informations from the outside world by means of various senses such as his senses of sight hearing and touch These informations are transmitted to the brain which in response gives commands so that optimum adjustment and control is made to the ever changing outside environment The same mechanism applies to the changing environment inside the body Transmissions of these informations are done through the multi channel networks of the nerve system and the hormone system

There are some responses of the nerve system that skip the brain short circuiting between the spinal cord and the terminal organs like those reflex movements in emergencies Representative of these is the sense of pain The time it takes to respond to the given stimulus is only several milliseconds If the human body were connected to a high speed computer that responds in terms of nano seconds the strange phenomenon would take place of the machine s responding even before the man feels pain

The human eyes cannot instantaneously recognize four channel signals which are displayed simultaneously Accordingly in order to achieve the compatibility

the machine must idle and have a redundancy to match the human eyesight

This redundancy is a very important condition in the compatibility of man and machine

Another important thing to be considered is the relationship between the total system and the sub systems in the human body

The human body is composed of the circulation system that pumps blood from the heart into periphery the digestion system that supplies energy the bone muscle system that is responsible for movements the urinary system that disposes of waste and the central nerve system that serves to control the total functions

These organs comprise sub systems They function on their own within the framework of the total system in a compatible manner However should an emergency arise the independent functions and autonomy of the sub systems are supressed for the sake of the survival of the total system

When the amount of blood in the human body starts decreasing as a result of bleeding and the blood flow from the heart declines the supply of blood becomes scarce in such areas as limbs kidneys stomach liver heart and brain in that order While there may eventually be little blood in the limbs the blood flow is maintained to the brain until immediately before death

Faced with death the body sacrifices the limbs to sustain the functions of the brain and the heart that are essential to the total system

In the symbiosis of man and machine a control system of this kind is needed to consider as the total system If the sub systems of machines are designed only on an inflexible mechanical basis to be integrated into the control system and connected to a human body it would even pose a danger to the human body

It would be interesting to trace the analogy between the reactions of the total system to the sub system in the human body and those in the social system

The brain system is the most important organ in a human body and although it is most vulnerable to the termination of blood circulation its functions are sustained in an emergency until the last moment even at the sacrifice of the rest of the organs Because the brain is the most important organ of the human body it is easily be destroyed and in a sense is made flexible

What is the brain in the social system? It is the political system the central agencies of the government and the so called thinktanks which centralize information and issue commands

These must be structured flexibly enough to be able to adjust alternating destruction and construction in response to changes in the environment

For that purpose such conditions as (i) division into units (ii) exchange ability and (iii) compatibility are required

Should the total system fall apart it would take time and effort to reconstruct it It would be much more efficient to make it from independent units More over each unit is replaceable and the new unit must be compatible with the rest of the system and capable of the unrestricted exchange of information with it when it is incorporated into the total system in place of the old unit In other words the relationship between the unit and the system is like that of the printed circuit plate to the electronic instrument or the module to the computer From this it should be easy to understand the relationship

In government agencies in the course of time some unnecessary divisions or sections are to be abolished and others are to be expanded In practice however it appears there are few unnecessary divisions or sections that are abolished with the result of accumulation of waste year after year This is similar to the aging process of the human brain



## ARTIFICIAL EVOLUTION OF THE HUMAN BEING BY GENETICS ENGINEERING

Remarkable progress has recently been made in genetics and the separation and identification of individual genes has reportedly been done successfully

As more genetic information is thus made clear the mechanism of cancer and the instinctive abilities of living creatures in general to distinguish themselves from others are expected to become clear And there will come a time when the ways and means to control cancer and the rejection reaction will be developed and applied in practice

In the 21st century by means of enzymes viruses or laser beams genetic control will become possible and hence the technology for promoting artificial evolution of mankind the technology for man reconstruction will be in the hands of human beings themselves Such biological technologies which mankind has never known before will be applied in practice

On the other hand a new method called cron of developing a group of single cells from one unit cell has been successfully tried on frogs If this method is developed to the extent that it is applied to higher species of life like human beings there is a good possibility of creating two or more biologically identical human beings

With respect to genetic information their being identical would mean that these human beings created through cron would be capable of organs exchange It would be possible to create as many people as desired who could easily adjust to abnormal environments like astronauts and the people thus created would be most capable of joint ocean projects which require good team work

Since identical copies would be made of one single man the cron man would be immortal

However as this artificial evolution progresses there will be less room for the natural process of weeding out undesirable characteristics and it is feared that this might prove harmful to the evolution of mankind

There is another serious problem as to who decides the right course for the future reconstruction of human beings

If these biological technologies are entrusted exclusively to a small number of leaders of the society their control of the technologies will most likely to be irreversible

If so there will be no way to feed back criticism and then mankind will be on the road to total extinction

The technology of artificial evolution is just beginning but it is expected to develop at an accelerating pace When this technology is perfected and applied in practice it might well be an irrevocable situation Before that process is triggered there are many problems to be solved by the wisdom of all of mankind It is imperative that these problems be listed

Since the impact that these technologies will have on mankind is extremely great there will likely be developed technologies to assess their possible long range effects

This will call for the prompt establishment of an international control com mission to manage these technologies a system to freeze these technologies temporarily or some methods to assess their long range impact

Life has its limits and any individual unit is not allowed to continue to create and develop for eternity That is why life terminates and the younger generations inherit the legacies of the older generations in the form of genetic information that is passed on from generation to generation

By the same token the abilities and life of mankind have their own limits and there is inevitably death to them all

In ancient times the great horned deer became extinct because of its dis proportionately large horns and the mammoth became also extinct because of its enormous size Their bodies antlers and tusks were too well developed to sustain the physiological balance and to sustain life

Is it not true that mankind has begun to possess nuclear energy bio chemical weapons and genetic engineering all of which mankind is incapable of control ling?

Unless mankind concentrates all available wisdom on rearming itself with the reason and morals with which to control these technologies mankind too will surely be on the path to extinction

# DYNAMIC BALANCE IN POLITICAL INNOVATION

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## DIFFICULTIES OF POLITICAL INNOVATION

Innovation in the political field is generally accompanied by a number of difficulties especially when it is to take place in the politics of a modern country

The primary reason for the difficulties is that while all other fields of human activities make progress according to their respective and independent rules innovations in politics come *after* changes in other fields as though political innovation is the result of the preceding changes or is intended to restore order in the society shaken by preceding changes

Politics then may be thought of as a system and systems necessarily lag behind to some extent Systems are shaped in order to adjust the relationships among a number of new factors and thereby to maintain order among them Systems in other words are agreements made and observed by members of the society so that the whole of the society can best maintain its stability Therefore systems are formed on the basis of past data and so must to some extent lag behind present events

Often technical innovations bring forth industrial and economic develop ments and a system is then born in the resulting new society in order to maintain order in that society Politics and laws thus require some delay in their forma tion and there is a trend in some advanced nations protesting the precedence of politics in the society

The second reason for the difficulties of political innovation is that systems once formed are not easily changed Because the society has an ever increasing number of people in it who are accustomed to the society and its order social order is generally conservative in nature People have an instinctive desire for stability and feel threatened by change After a system has existed for some time the public gets accustomed to it and since change must be accompanied by unpredictable factors the public preferring the present situation to un certainty begins to dislike change

In the third place it is fundamental to modern nations that they are not

readily susceptible to revolutionary change Industrial countries having extensive accumulations from their past efforts revolutionary action faces too much resistance in modern nations Changes in the advanced nations are always metabolic and continuous and it is difficult to plan metamorphic and discon tinuous changes Revolution is possible only in underdeveloped countries In advanced nations progress is always slow and grievances can be redressed only gradually

Many of the social phenomena in the advanced countries are closely inter related and a change in any part necessarily affects a wider sphere of the society Therefore innovation in an advanced country cannot be planned unless one is sure of being able to cope adequately with its possible effects on the rest of the society Only gradual change can be planned Even if a large number of people comes to be dissatisfied with the present social system revolution would only destroy their precious accumulations from the past The risk is too great Thus the result is that innovation inevitably gives the impression of proceeding at an irritatingly slow pace in the advanced nations

## NEED FOR TECHNOLOGY ASSESSMENT

Despite the difficulties of political innovation explained in the preceding section there are increasing demands today for political innovation and creative solution to certain problems in the modern society

First of all the modern society is beginning to face problems that cannot be handled properly by its natural capacity for self adjustment

Air pollution and other public health hazard pose a serious threat in many of the advanced nations The United Nations reported in 1969 on the pollution of man s environment in the industrialized countries of the world and an international conference will be held in Sweden in 1972 on the problems of environmental pollution and how to cope with them This problem is one evidence that modern social development has already gone beyond the society s capacity for self adjustment

In the past efforts for improvement by individual enterprises and individual organizations have usually been linked to the improvement of the total system to which they belonged In other words because nature existed between these sub systems of the society and functioned to adjust the society s problems the improvement of sub systems naturally led to the improvement of the total system

Recently however this picture has changed As a result of the development of the sub systems the natural capacity for self adjustment that existed between sub systems is no longer capable of digesting and absorbing the frictions and evils arising between the sub systems of the society The accumulation of improvements in the sub systems has not always led to the improvement of the total system

An increasing number of traffic accidents environmental hazards the prob lems of waste disposal the effects of insecticides and other newly developed drugs on man s health and a number of other problems have been the result

These visible problems combined with some other problems of the human



spirit have led men to think about the improvement of the total system Men as creatures of nature are naturally equipped with the capacity for adjusting to their environment and have adequately adapted themselves to the technical economic and social development of their society But the accelerated industrial development has made it difficult for men to adjust to the changes in their environment Men are flexible creatures but flexibility alone no longer seems able to cope with the situation

Many of the technical achievements of the society are attained by a man machine system planned so that man might intervene between machines with his abilities In this system men often perform those functions that cannot be done by machines Yet when machines begin to demand too much of men men will be unable to meet that demand as happens so often today Machines have begun to exert psychological pressure on men as new technologies are developed and there is a growing number of machines that can not be operated by men of average ability The problems of alienation arise and a wide spread antipathy develops against that civilization and technology This is reason enough for 1970 s to be called the age of technological assessment There is a strong need for a system capable of even assessment of technology and it is in this direction that political innovation is required

## COPING WITH RAPID CHANGE

The second reason for the increasing need for a change in the system and political innovation is that the pace of change in the modern society is becoming ever faster As noted in the preceding section changes in the modern society are always metabolic in nature and that social change resulting from tech nological innovation is no exception Yet while these changes are metabolic many of them are so fast as to give the impression when seen over several years of having been metamorphic Our society in other words is a society of rapid change

Old systems cannot function properly in a society of rapid change On the contrary old systems often begin to obstruct change In Japan for instance the out dated Public Telecommunications Law is obviously beginning to hinder social development in the informational age Data communication is considered essential to the exchange of information in the the informational age and a drastic revision of the Public Telecommunications Law is required if this need is to be met

No nation should forget to adjust its systems and politics so that they do not hinder smooth social development in terms of technology industry and econ omy Rather it is necessary to reinvestigate society s systems and politics so as to give a fresh impetus to development

The same thing applies to international systems While a country s activities used to be limited to within its administrative boundaries there are now new kinds of national activities which transcend administrative boundaries such as the development of underwater resources and space exploration Countries that pioneer these new kinds of activities naturally have a big advantage over other countries

In space exploration for instance the best position for a communications satellite synchronized with the earth s movement is 35 700 kilometers over that point where the international date line crosses the equator in the Pacific Ocean if the satellite is to be used for communication between Asia and the United States Similarly there are a limited number of appropriate positions for com munications satellites over the Atlantic and Indian Oceans as well Therefore the country that first launches several satellites into these points will naturally be in an advantageous position

Likewise those countries that successfully develop the technology for exploit ing underwater resources will have an overwhelming advantage against com petitors if underwater development is left to free competition It was for this reason that the smaller countries worked together at the 1969 United Nations General Assembly to pass a resolution obliging all nations and individuals of the world to refrain from developing underwater resources beyond their ter ritorial waters until an international system is established for underwater exploitation and refusing to recognize any national or individual claims on such underwater resources The nations of the world now need new systems and agreements to cope with the new scope of technological developments The United Nations Committee on the Peaceful Uses of Outer Space and the U N Committee on the Peaceful Uses of Underwater Resources are two such ex amples and a kind of international political innovation is needed in order to let these organizations function propeily

This need for international political innovation also arises from the fact that technological innovation tends to be directly linked with the development of new weapons by the great powers This is the reason that the Strategic Arms Limitation Talks (SALT) began by the United States and the Soviet Union ought transcend the conventional and become a series of epoch making creative negotiations

The third problem raised by the accelerated pace of change is that the present is an age of gap Among the many gaps faced the most serious is that of the generation gap a problem with grave social consequences in those advanced countries facing a new world of diverse values pitted against each other In olden times change took time and the younger generation had replaced the older one by the time the gap in values became manifest Such is not the case today Society today contains coexisting generations with many differences and there is a need to create a new system coordinating these conflicting generational values so that they can coexist in peace in the society

Systems are mainly for management but management alone is not sufficient to keep a society moving At the same time management should be accompanied by a new system to provide for the early input of new data so that the managerial system can always be kept up to date That is management should be accom panied by participation

The participatory system can also be called an experimentation system since it conducts continuous experimentations and co opts those who pass into the managerial system While this may not be enough to close the generation gap a number of experiments are required at present to create new systems that can accept diverse values within one society



## SYSTEMS FOR DIVERSITY

The fourth reason requiring political innovation is the increasing diversity of values in the modern society While this relates to what was mentioned in the previous section about plural values coexisting in conflict within the society the number of such plural values will in the future increase as the society devel ops That is it is thought inevitable that society become ever more diverse

In the future there is no reason why each man should not have his own value system different from others just as his face is different from other faces Al though economic social and historic restrictions have kept individuals from actually developing their own value systems such development should be pos sible in an affluent society with fewer economic restrictions

Political innovation is required to prepare for the birth of systems in which people with diverse value systems can live together in an orderly fashion

Dissatisfaction with society increases as the diversification of value systems proceeds in the society and this is further heightened by technological develop ments which open up new possibilities for human achievement and thereby naturally increase human desires While it is technically possible to resolve these discontents the resource limitations often make it impossible to take the practical measures for their prompt solution Thus it is possible that the public may feel that technological development is unrelated to human happiness New political systems capable of coping with such discontents are necessary

## VALUE OF CHANGE

As has been already noted society needs political innovation in spite of its many concomitant difficulties

Thus it becomes necessary to consider concrete ways of achieving political innovation

Without going into each of these ways in detail the first is to find a value in a change itself

Politics and laws being systems often resist change and this is consistent with the opinion that unchanging systems are better This kind of opinion may be said to hinder political innovation

In order to change this situation it is imperative that people feel that anything without change always carries the threat of stagnation and that it is precisely those systems which change that are valuable because they change This way of thinking which can be called valuing for the change itself would naturally lead to the conclusion that systems need continuous adjustment No system no policy can be a permanent and fundamental solution to anything Technology continues to develop and society continues to change There can be no perma nent means to anything Although they may appear irresponsible flexible on the spot countermeasures are best suited to the ever changing problems Ever developing problems require dynamic countermeasures New developments

always pose new problems so changes in the system should be made before the problems get serious This might be called a patchwork system

Early prediction of future problems is essential in order to bring about political innovation and the menas for such prediction are already available in such soft technologies as futurology technological prediction social engineering and other disciplines that can be utilized for political innovation System engineering can also serve that purpose as can such practical tools as communication channels and computers to collect transmit and process vast amounts of information

By using such means it is possible to predict future changes ready ourselves for them and even plan necessary changes

It was mentioned at the beginning that there is a time lag in all systems but that lag can be held to a minimum by the use of systems to communicate and process vast amounts of information

Man is beginning to have new means of predicting his economic and tech nological future and making effective choices and decisions on the basis of such predictions

Systems invariably require innovation and the day is finally dawning when man can institute political innovation with the knowledge that he possesses the means to make such innovation possible