COMMUNICATION THEORY in the CAUSE of MAN

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Notes on the application of General Systems Theory, Cybernetics, Information Theory, and related fields of Communication Theory to the strengthening of democratic institutions on our planet.

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EDITORIAL NOTES

This complete issue was written by our son, Frederick Bruce Wood.

Frederick Bernard Wood

BIOGRAPHICAL NOTE

Frederick Bruce Wood graduated from Willow Glen High School, San Jose, California, in June 1963. He obtained a B.S. degree in electrical engineering at Oregon State College, Corvallis, Oregon, in June 1967. He obtained the M.B.A. degree at Harvard Business School in June 1969. He has worked summers on jobs representing a cross-section of American institutions, including private industry, public utilities, and local government. While at Harvard Business School, he was editor of The HarBus News. He is currently an Assistant Professorial Lecturer in Management Science, College of General Studies, The George Washington University.

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p. 5 table by John Platt	John Platt and American Association for the Advancement of Science
p. 24 charts by Pitirim Sorokin	Harper & Row, Publishers, Inc.

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Division 1.6: AN INTEGRATIVE FRAMEWORK FOR A NEW FRONTIER

by Frederick Bruce Wood, M.B.A, Assistant Professorial Lecturer,
Management Science, College of General Studies,
The George Washington University, Washington, D.C.

Section 1.6.0: Introduction: Frontier Shock

Toffler's "future shock" -- the alienation of man from his referent culture due to the accelerating rate of social, economic, and technological change -- is clearly in evidence on an almost epidemic scale in American society. But it seems to me that there is another kind of shock which confronts us squarely between the eyes. This is the shock coming from the realization that the future is what man makes it, that both utopia and annihilation are within our grasp, that past precedents are not the optimal bases for future action, and that we are living on the frontiers of individual and social evolution and revolution.

In contemplating the future of man and organization, I am immediately faced with the very difficult prospect of predicting our state of affairs at some future time and -- in order to lend even minimum credibility to such projections -- predicting how we are going to get from here to there.

Two currently quite popular approaches to futurology are exemplified by Herman Kahn and John Platt. Both use the basic methodology of extrapolation, but Kahn's projections are outcome-oriented whereas Platt's are problem-oriented. Kahn, for example, has made extensive extrapolation of so-called emergent trends in developing his scenario of the"U.S. Year 2000 Post-Industrial Society" which comes out in rather optimistic terms (ie. a "learning society," humanistic, affluent with minimum income, "search for meaning and purpose in life will at least find an interim solution," etc.) as shown in Figure One.

In stark contrast is Platt's approach which classifies future problems and crises by time and intensity, as shown in Figure Two.

Figure One -- The Emergent U.S. Year 2000 Post-Industrial Society

(from Herman Kahn, "The Emergent Society," The Management of Information and Knowledge, (Wash.D.C.: Government Printing Office, 1970), p. 20.)*

RELATIVELY A-MILITARY, RELATIVELY A-POLITICAL, "SURPRISE-FREE PROJECTIONS" OF THE "MOST SIGNIFICANT" ASPECTS OF THE FINAL THIRD OF THE TWENTIETH CENTURY

1. CONTINUATION AND/OR TOPPING OUT OF MULTIFOLD TREND
2. ONSET OF POST-INDUSTRIAL CULTURE IN NATIONS WITH 20% OF WORLD POPULATION & IN ENCLAVES ELSEWHERE
3. "POLITICAL SETTLEMENT" OF WORLD WAR II--INCLUDING THE RISE OF JAPAN TO BEING THE THIRD SUPERPOWER (OR NEAR SUPERPOWER) & THE REEMERGENCE OF "GERMANY"
4. WITH IMPORTANT EXCEPTIONS, AN EROSION OF THE TWELVE TRADITIONAL SOCIETAL LEVERS AND A CORRESPONDING SEARCH FOR MEANING AND PURPOSE
5. THE COMING 1985 TECHNOLOGICAL CRISIS--NEED FOR WORLD-WIDE (BUT PROBABLY AD HOC) "ZONING ORDINANCES" & OTHER CONTROLS--A POSSIBLE FORCED TOPPING OUT OF #1 ABOVE
6. ONSET AND IMPACT OF NEW POLITICAL MILIEU
7. RISE OF A "HUMANIST LEFT"-"RESPONSIBLE CENTER" CONFRONTATION--PARTICULARLY IN THE HIGH (VISIBLE) CULTURE
8. INCREASINGLY "REVISIONIST" COMMUNISM, CAPITALISM, & CHRISTIANITY IN EUROPE & WESTERN HEMISPHERE
9. A GENERAL DECREASE IN CONSENSUS & AUTHORITY--A GENERAL INCREASED DIVERSITY (AND SOME INCREASED POLARIZATION) IN IDEOLOGY, IN VALUE SYSTEMS & IN LIFE STYLES
10. INCREASING PROBLEM OF TRAINED INCAPACITY AND/OR ILLUSIONED OR IRRELEVANT ARGUMENTATION
11. WORLD-WIDE (FOREIGN & DOMESTIC) "LAW & ORDER" ISSUES
12. POPULIST AND/OR "CONSERVATIVE" BACKLASH & REVOLTS
13. BETTER UNDERSTANDING OF & NEW TECHNIQUES FOR SUSTAINED ECONOMIC DEVELOPMENT ALMOST EVERYWHERE
14. HIGH (1-15%) ANNUAL GROWTH IN GNP/CAP ALMOST EVERYWHERE
15. WORLD-WIDE CAPABILITY FOR INDUSTRY & TECHNOLOGY--RECENTLY A GROWTH IN MULTINATIONAL CORPORATIONS AND CONGLOMERATES
16. MUCH TURMOIL IN AFRO-ASIA & PERHAPS LATIN AMERICA
17. NATIVIST, MESSIANIC, OR OTHER "IRRATIONALLY" EMOTIONAL MASS MOVEMENTS--GENERAL DECREASE IN RATIONAL POLITICS
18. A RELATIVELY MULTIPOLAR, RELATIVELY ORDERLY, RELATIVELY UNIFIED WORLD--I.E., ENORMOUS GROWTH IN WORLD TRADE, COMMUNICATIONS, & TRAVEL; LIMITED DEVELOPMENT OF INTERNATIONAL AND MULTINATIONAL INSTITUTIONS; SOME RELATIVE DECLINE IN THE POWER, INFLUENCE & PRESTIGE OF U.S. & U.S.S.R.; NEW "INTERMEDIATE POWERS" EMERGE: E.G., E. GERMANY, BRAZIL, MEXICO, INDONESIA, EGYPT, ARGENTINA, ETC.; A POSSIBLE CHALLENGE BY JAPAN FOR WORLD LEADERSHIP OF SOME SORT, CHINA & EUROPE BOTH RISE & FALL

* This report was a compilation of papers prepared for the eleventh meeting of the panel on science and technology, Committee on Science and Astronautics, U. S. House of Representatives

Figure Two -- Classification of Problems and Crises By Estimated Time and Intensity

Table 2. Classification of problems and crises by estimated time and intensity (World).

Grade	Estimated crisis intensity (number affected × degree of effect)		Estimated time to crisis*		
			1 to 5 years	5 to 20 years	20 to 50 years
1.	10^{10}	Total annihilation	Nuclear or RCBW escalation	Nuclear or RCBW escalation	✠ (Solved or dead)
2.	10^{9}	Great destruction or change (physical, biological, or political)	(Too soon)	Famines Ecological balance Development failures Local wars Rich-poor gap	Economic structure and political theory Population and ecological balance Patterns of living Universal education Communications-integration ↑ Management of world ↑ Integrative philosophy
3.	10^{8}	Widespread almost unbearable tension	Administrative management Need for participation Group and racial conflict Poverty–rising expectations Environmental degradation	Poverty Pollution Racial wars Political rigidity Strong dictatorships	?
4.	10^{7}	Large-scale distress	Transportation Diseases Loss of old cultures	Housing Education Independence of big powers Communications gap	?
5.	10^{6}	Tension producing responsive change	Regional organization Water supplies	?	?
6.		Other problems—important, but adequately researched	Technical development design Intelligent monetary design		
7.		Exaggerated dangers and hopes			Eugenics Melting of ice caps
8.		Noncrisis problems being "overstudied"	Man in space Most basic science		

* If no major effort is made at anticipatory solution.

* This chart has also been reprinted in CURRENT (magazine) and in Ekistics. See also John Platt, "What We Must Do: A Mobilization of Scientists," Ekistics, December 1969, p. 450.

Just a glance at the high intensity problem areas which Platt expects to reach crisis levels within five years (given no major effort at an anticipatory solution) -- nuclear or RCBW escalation, administrative management, need for participation, group and race conflict, environmental degradation -- is enough to point out the obvious conflict between the two approaches. Kahn appears to be implying that his scenario of the future is based on the assumption that major problems are solved and crises resolved favorably. Platt, on the other hand, is saying there is no basis on which to make this assumption and that, in his view, extrapolation of current trends does not support Kahn's rosy view of the future. To the contrary, if these problems are not solved, there may not be much of a future to project.

Thus it seems to me that extrapolation of emergent and current trends is not sufficient in itself for adequate projection of the future and how to get there. Fortunately there are other methodologies of futurology, as Daniel Bell has discussed in Toward the Year 2000: Work In Progress, such as forecasting models (a combination of time series, mathematically expressed, that makes assumptions about future expectations), the Delphi technique (where a group of experts makes predictions in specific areas, and the results are fed back repeatedly to clarify consensus and dissensus), and, finally, cybernetic models. The latter would seem to provide the best framework within which projections of the future of man and organization can be made.

In Stafford Beer's view, any reasonable speculation of the future must be in a systemic context. Techniques like Delphi provide only somebody's or some group's best educated guesstimate of a most likely alternative future, but do not give any realistic attention to how we can or

will get there. What are the links between now and the future? How will today's systems evolve into future systems? To predict the future and to make the future what we want -- by solving problems which block our way -- requires as a beginning an understanding of the systems we have now from which will emerge -- one way or another -- the systems of tomorrow.

Thus the approach to be used in this paper will be just the opposite of most futurologists. The cybernetic systems approach will be used first in order to hopefully understand better what is going on now in our society -- for example, how do technology, values, general systems theory, organization development, and the matrix process fit in -- and then within this framework extrapolations of the future of organization will be explored.

The scope of this paper is breadth and not depth. Thus, while many areas will be touched on, few will be covered in great detail. But hopefully the substance of what I am saying will be provocative enough to encourage new ways of looking at -- and making -- the future of man and organization. The text has not been footnoted, but authors are noted in context so that the list of source materials by author in the bibliography can be referenced at will.

Section 1.6.1: The Cybernetic Systems Perspective

Stafford Beer presented one of the better descriptions of the cybernetic systems perspective in his testimony at the "Management of Information and Knowledge" panel discussion sponsored by the House Committee on Science and Astronautics last spring.

Cybernetics -- the science of communication and control in man and machines -- can help us understand and organize large, complex systems. Some of the basic principles of cybernetics, as presented by Beer, include: 1) Self-regulation and self-organization are natural laws governing the behavior of large, interactive systems, 2) such behavior depends on the dynamic structure of systems including such things as feedback loops, communication channels, etc., 3) Ashby's Law of Requisite Variety (variety is the cybernetic measure of complexity) which states that an organization can cope with the environment only if it can match the variety of the environment ("variety destroys variety"), and 4) Le Chatelier's Principle which states that esoteric or black boxes are very difficult to influence externally.

Esoteric boxes, in Beer's definition, are social institutions such as business, government, universities, etc.; and are called "esoteric" because they are complex and unintelligible to outsiders; and are highly resistant to external change efforts. The esoteric box's own survival and performance come first before that of the external society.

The problems are as follows: 1) greater interaction among boxes and between boxes and the environment coupled with a high variety environment have combined to create an orders of magnitude increase in the complexity of our society and a resultant data overload, 2) changes in technology etc. are blurring

the interfaces of esoteric boxes and are moving the interfaces of esoteric boxes and other boxes and the environment; the boxes are not responding, they aren't adapting to these changes, 3) the metasystem (a system which stands above in hierarchy -- a logically superior system) which includes the religious, moral, and legal framework or the "external structure" of society is being systematically abandoned so that it ceases to be relevant for negative feedback control; 4) the "internal structure" of the boxes is inextricably tied to the metasystem so that internal control and feedback mechanisms are being eroded also. The net result is that the boxes (our social institutions) are internally unstable, the strings and networks of boxes are unstable, and the metasystem is fast disappearing.

But Beer goes on to say that we now have the technological capability available to handle these problems of managing modern complexity, if we learn how to use technology properly. We can now automate whatever we can exactly specify, even purposive systems. We can use computers and information technology to simulate and to transform data into information. We can use communications technology to open new feedback channels, clear out old ones, etc.

The way in which the cybernetic systems perspective -- as elaborated by Beer -- might encompass such seemingly diverse concepts as matrix process, organization development, general systems theory, etc. with regard to the improvement of our currently unstable existence is as follows (with my questions added):

1. From Beer: In all cases, improved management of knowledge within esoteric boxes is the more rapid matching of sets of possible courses of action to sets of actual conditions and the rapid correction of mismatches (higher variety esoteric boxes). Is the matrix process a way to make this improvement?

2) From Beer: In all cases, improved management of information between boxes is an integral information network and mutual trade-off of knowledge. Are communications and computer technologies ways to make this improvement?

3) From me: In all cases, improved functioning of the boxes and the metasystem requires better interfacing between changing and divergent value systems within **boxes, between boxes and metasystem, and in the** metasystem. Is organizational development a way to make this improvement?

4) From me: In any case, a new metasystem is needed to provide the internal and external feedback loops for system stability. Are general systems theory, communications theory, and information theory ways to make this improvement?

5) From me: In any case, problem-solving must be improved on an individual, group, organization, and societal level so that we may indeed achieve the desired alternative future. But Platt's problems must be solved first, or we will never make it. Are all of the above concepts in synergistic and cybernetic combination a way to make this improvement?

Thus does the cybernetic systems perspective provide a framework for the integration of relevant concepts and technologies from the management, cybernetic, behavioral, physical, engineering, and other sciences, the humanities, etc. towards understanding our present systems as a first step in solving urgent problems, projecting alternative futures, and learning how to get to the optimal future -- of man and organization -- from the present.

One useful effort to develop a model which organizes all of these concepts is shown in Figure Three. This model relates the various levels of phenomena (physical, chemical, biological, psychological, social), stages of activity (basic science, applied science, education, decision and action),

and methodological approaches (scientific-empirical, abstract-philosophical, humanistic-intuitive) together in a three dimensional matrix such that the different mix and sequence of concepts (phenomena, activity, and method) needed to analyze and solve a particular problem -- or to predict an alternative future -- can be better visualized.

The utility of this approach might be demonstrated as shown in Figure Four where I have placed four conceptual areas -- communications and computer technology, organization development and matrix process, cybernetic systems, and value systems -- on an unfolded version of the three dimensional matrix. Even though my evaluations are subjective and could be better refined, the results do show how this particular mix and sequence of concepts serves to integrate and bridge the gaps between, for example, physical-scientific-basic science and social-humanistic-decision and action, the two cultures of humanities and sciences (C. P. Snow), and the generations.

Figure Three — An Integrative Model of Phenomena, Activity, and Methods

(from Frederick B. Wood, "How Is Your Sociological Imagination," CTCM, Vol. I, No. 3-4, August-September 1970, p. 5.)

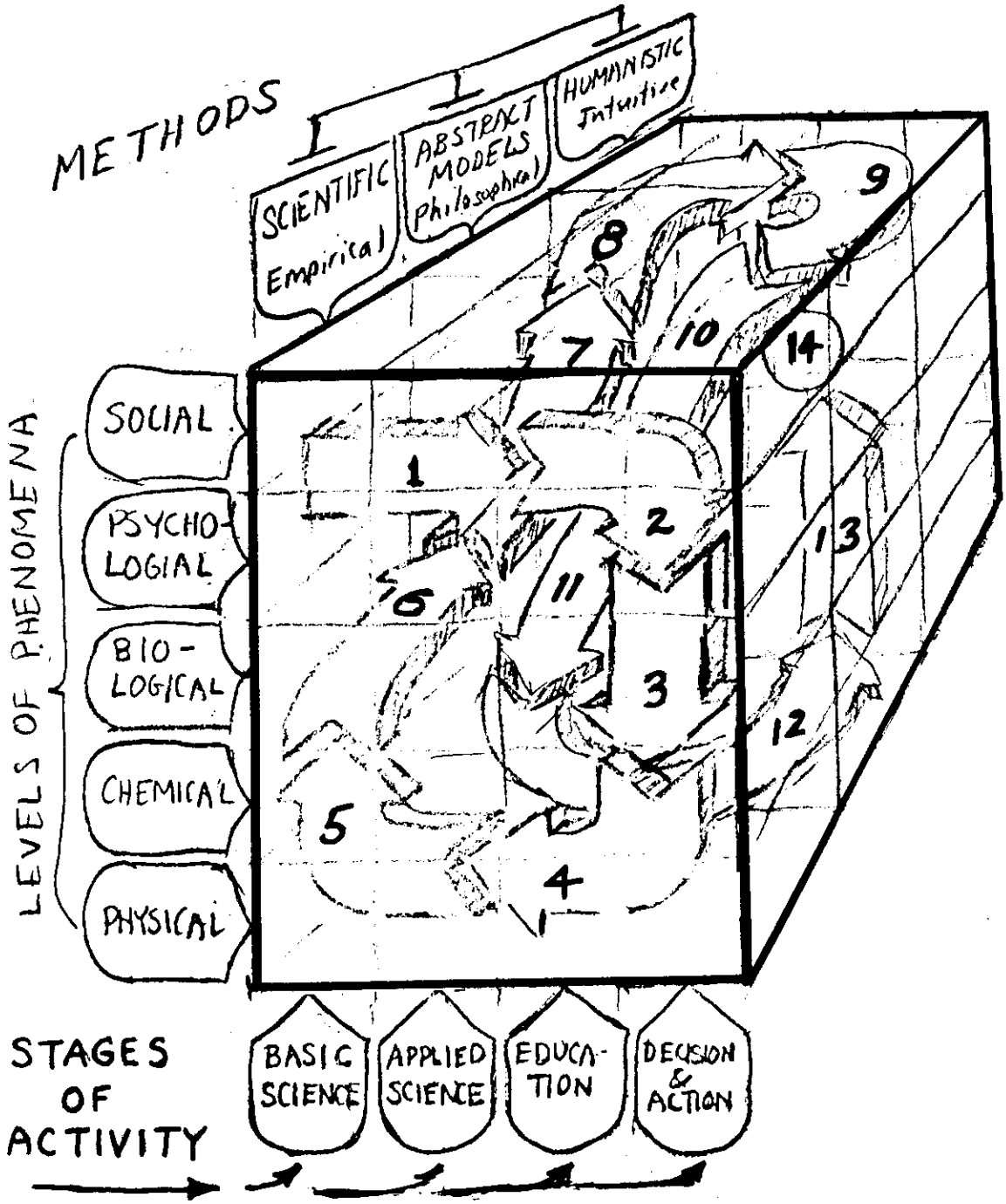
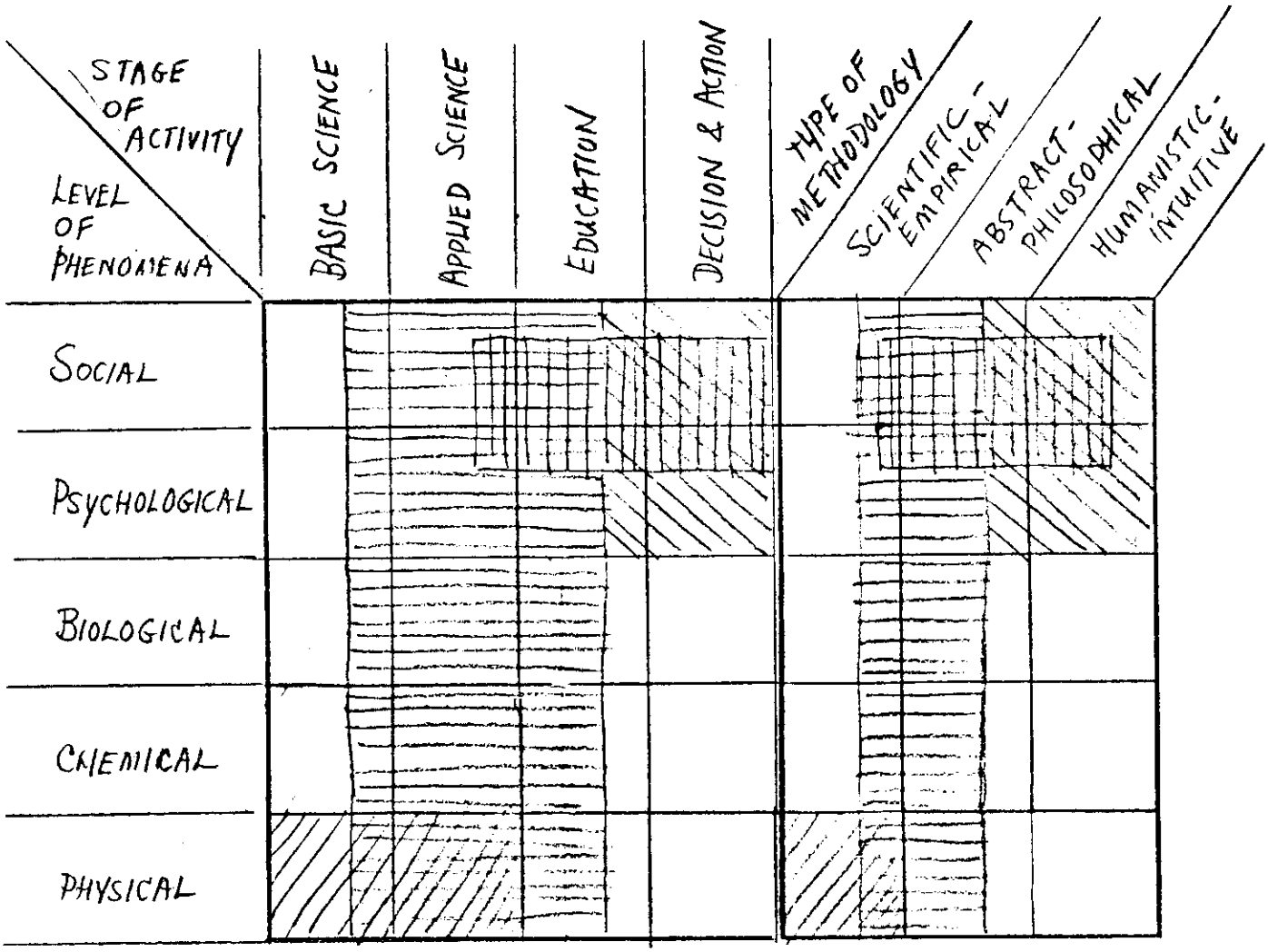


Figure Four -- Sample Application of Integrative Model



= Communications & Computer Technology

= Organization Development & Matrix Process

= Value Systems

= Cybernetic Systems

Section 1.6.2: Technology in Revolution

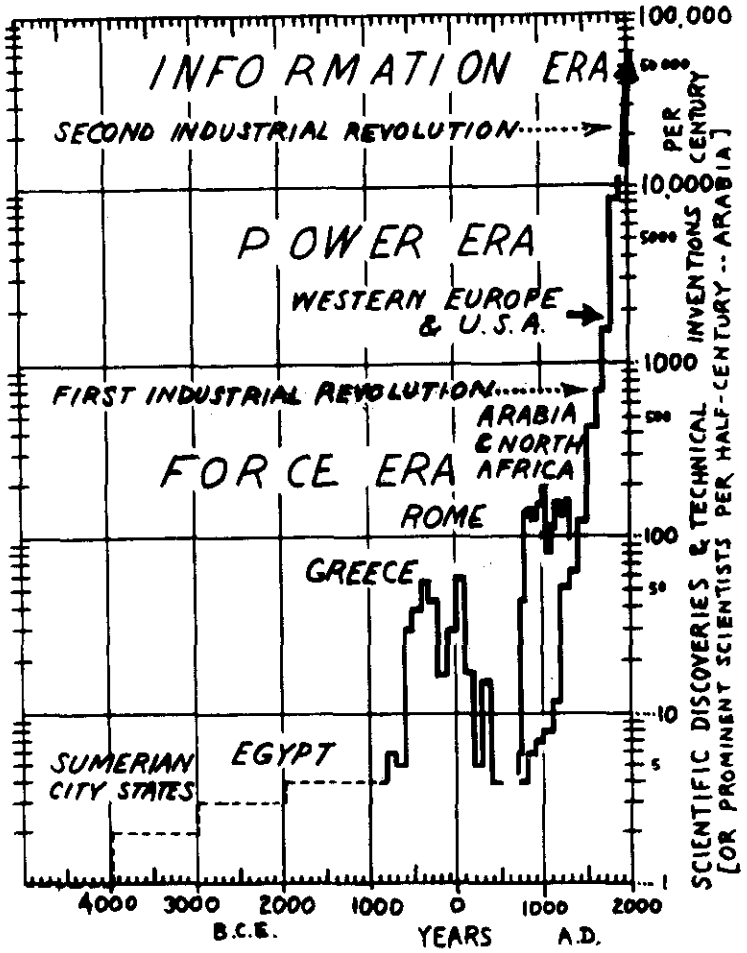
One of the most pervasive causes of rapid social change in America -- with heavy import for the future of man and organization -- is technological evolution or, probably more appropriately, technological revolution. One of the first to note the exponential upward trend in technology was the late Harvard sociologist Pitirim A. Sorokin who measured this trend by the number of scientific discoveries and inventions per century. His work has been extended by Frederick B. Wood (as shown in Figure Five) who replotted Sorokin's earlier data.

But Wood has placed these curves in more meaningful light by defining three major stages in the development of human civilization which correlate with three stages in technological development: the Force Era, the Power Era, and the Information Era. The Force Era was characterized by the amplification of force through the invention of the lever, pulley, and wheel; the Power Era by invention of the steam engine, electric motor, gasoline engine, and other power amplifiers such as atomic energy which resulted from a vast expansion of man's understanding of nature; and the Information Era by the development of radar, television, computers, and other information amplifiers.

The transition between the Force and Power Eras is usually referred to as the First Industrial Revolution (beginning around 1660); the transition between the Power and Information Eras is referred to variously as the Second Industrial Revolution, the Cybernetic Revolution, the Computer Revolution, etc. and began around 1950. The dates are of course approximate, but it seems evident that we are now well on our way into the Information Era -- or the Post-Industrial Cybernetic State, as some would prefer to call it.

Figure Five -- Historical Trend of the Number of Scientific Discoveries and Technological Inventions Per Century

(from Frederick B. Wood, "Discoveries and Technological Inventions Per Century." CTCM, No. 1-2, Vol. 1, June-July, 1970, p11)



Note: The "Information Era" shown on this figure is sometimes called the "Communication Era."

As implied above, the identifying technologies of the Information Era are the computer and communication technologies. And it is these two technologies which have had -- and will continue to have -- the greatest impact on man and organization.

The combination of emergent communication technologies such as domestic satellites, lasers, waveguides, cable television, Touchtone, Picturephone, and electronic video recording in combination with the emergent fourth and fifth generation computers -- with on-line information and some degree of artificial intelligence -- are expected to have the following impacts, among others:

1. By the end of the decade, computers will be as numerous as telephones, and improved interactive systems will enhance the man/machine interface and facilitate the transition to a fully cybernated society.

2. Information utilities and data banks will make computer power available to business, government, and the public in the same ways that electric or other utilities service offices and homes.

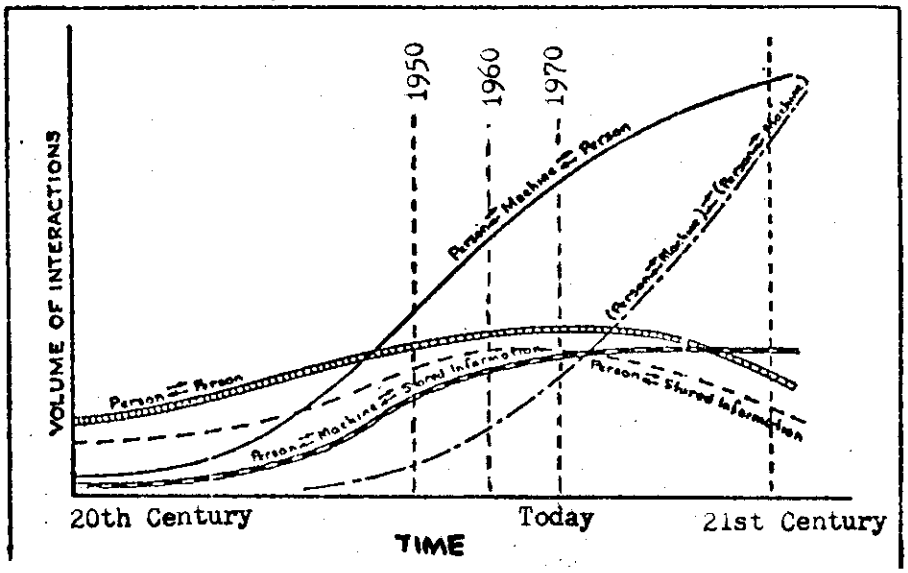
3. High-speed communications systems will transmit data messages almost instantaneously between any two points.

4. Government officials, businessmen, scientists, students, and housewives will converse with computers,over communications links or directly, as readily as they now talk by telephone.

A decade and a half ago (in 1956), Richard L. Meier developed an extrapolation of these trends in computer-communication technology in terms of the "volume of interaction" for five modes of communication. The trends, reproduced here in Figure Six, would appear to be a pretty accurate picture of what is going on in the real world and have been verified to some extent by Richard Ericson and Fred Wood.

Figure Six -- Trends in Five Modes of Communication

(from Richard Ericson and Fred Wood, "Trans-Modal Impacts of Telecommunication and Teleprocessing Technology," Program of Policy Studies, George Washington University, June 16, 1970, p. 2.) **



Category	*Examples*
1. Person ⇄ Person	1. Face-to-face contact through auditory facilities.
2. Person ⇄ Stored Information	2. Reading, writing, mail, books, reports, memoranda, telegrams, newspapers, magazines, etc.
3. Person ⇄ Machine ⇄ Person	3. Telephone, closed circuit television, radio.
4. Person ⇄ Machine ⇄ Stored Information	
5. (Person ⇄ Machine) ⇄ (Person ⇄ Machine)	

**This figure from Ericson and Wood was adapted from:

F. W. Memmott, "Substitutability of Communications for Transportation," Traffic Eng, Vol. 33, No. 5, Feb 1963, pp. 20-25;

Which was in turn adapted from:

R. L. Meier, "Communications and Social Change," Behavioral Science, Vol. I, No. 1, January 1956, pp. 43-58.

In the first two communication modes -- person-person and person-stored information -- Meier predicted that long before the year 2000 we will have experienced an absolute decline in the amount of communication or volume of interaction. Even in the case of person-machine -- where the interface is directly with an information device -- he speculated that a plateau will be reached before 2000. But total volume of communications interaction is predicted to rise exponentially due to the accelerating rate of increase in person-machine-person and machine-machine or (person-machine)-(person-machine) modes.

Preliminary research indicates that these trends are in fact happening and that -- during the next two decades -- telecommunications and teleprocessing will come into their own as the lifeblood and central nervous system of man and organization.

For example, the whole concept of "work" may be drastically changed for many people in the not too distant future. By 1980 or 1990, via telecommunication-teleprocessing technologies, an individual might "go to work" by transporting his image, his voice, and his graphics to any number of "employers" during the course of the day. Although this is certainly an area where much research is needed, it seems highly likely that -- as physical movement increases in personal difficulty and social cost -- we will find that a large proportion of the reasons for physical travel today are effectively and satisfactorily accomodated by audio-visual "travel" tomorrow. We may literally communicate to work.

Thus, as Stafford Beer has pointed out, we have in technology one of the causes of system change and instability in man and organization alike, but in technology -- and especially the computer and communication technologies -- we also have the potential tools for solving our problems and making the future the way we want it to be.

Section 1.6.3: Values In Transition

As discussed earlier, Beer refers to the moral, legal, and ethical framework of a society as its metasystem. In his view, the metasystem in America and other high technology cultures is losing relevance and leading to the lack of adequate feedback control loops in the metasystem.

Herman Kahn agrees, I believe, with Beer but puts it another way. Kahn says that the twelve traditional social levers of control (ie. traditional sources of "reality testing," social integration, and/or meaning and purpose in life) are being eroded. Among the social levers which he sees disappearing are: 1) earning a living, 2) defense of frontiers, 3) religion, 4) tradition, 5) the "martial" virtues such as duty, patriotism, honor, etc., 6) the "Puritan" ethic including deferred gratification, work orientation, achievement orientation, sublimation of sexual desires, etc., and 7) a high degree of loyalty to nation, state, etc.

The relationships between changing values, technology, man, and organization can be logically developed in terms of the Force, Power, and Information Eras. During the Force Era, the American economic system was primarily agriculturally based with the lever, pulley, and wheel as primary technologies. The Individualistic Ethic was dominant because it facilitated the gradual transformation from the rigidly organized, hierarchic society of preindustrial England to the open, and largely agricultural, frontier of the "New World." In addition, this ethic reinforced the doctrine of natural liberty and the Protestant Ethic (Hebrew-Christian Ethic) which had been nurtured, despite severe repression, in Europe.

The Individualistic Ethic of the Force Era exalts freedom, particularly freedom of choice; self-determination; competition between individuals and with oneself; individual rights, irrespective of any social purpose; and individualism so long as these rights in no way infringe upon the equally justifiable pursuits of others. Individualist values include survival and physical well-being, dignity and self-esteem, freedom with responsibility, justice, thrift, scrupulous honesty, and hard work.

Then came the First Industrial Revolution brought on by the new technology of the Power Era. The Social Ethic was an attempt to answer the new social problems caused by technological, economic, and organizational changes. The Social Ethic downgrades competition between individuals; elevates the importance of individuals within a group context and advocates exalting the group spirit through educating people to sublimate ego; assumes that the group is the primary way of meeting individual man's needs and the prime locus of creativity; advocates personal adaptation to and solidarity with group, organization, and society; and assumes "belongingness" is the ultimate need of members of an organization. Social values include loyalty, dedication, organization, obedience, and self-sacrifice.

But now the Second Industrial Revolution is upon us as a result of the development of television, computers, communication, and other technologies. American society is moving into the Information Era and a post-industrial society. And several new value systems -- existential, situational, scientific, humanistic, and scientific-humanism -- have arrived on the American scene along with the Information Era.

While considerable evidence exists that all of the above value systems -- plus the Individual and Social Ethics -- are operative to varying degrees and in various combinations in the United States, the plurality consensus

seems to be that the trend is toward the scientific and, of late, the humanistic value systems with scientific-humanism representing an attempt to integrate both.

The scientific value system might be characterized by rationality, moderation, thoughtfulness, meliorism, flexibility, calculation, planning, and prudence while the humanistic values might include freedom, spontaneity, creativity, perceptiveness, participation, sensory awareness, joy and love, and self-actualization. Scientific-humanism ideally combines the positive values of each system (as given above) while minimizing the negative values such as dehumanization, scientism, and rationalism (potentially pathological scientific values) and permissiveness, anarchy, and lawlessness (potentially pathological humanistic values).

Just as the close link between technological change and social value system change has been clearly established, a similar link between changing social values and changing organizational values is evident. For example, Eric Trist has described what he perceives to be the change in social values from achievement, self-control, independence, endurance of stress, full employment to self-actualization, self-expression, interdependence, capacity for joy, full lives and the change in organizational values from mechanistic forms, competitive relations, separate objectives, own resources regarded as owned absolutely to organic forms, collaborative relations, linked objectives, own resources regarded also as society's resources.

Similarly, Robert Tannenbaum and Sheldon Davis see value changes in man and organizations moving away from a view of man as essentially bad toward viewing man as essentially good, away from negative evaluation of individuals toward confirming them as human beings, away from resisting and fearing individual differences to accepting and utilizing them, away from walling off

expression of feelings toward their expression and use, away from game-playing toward authentic behavior, away from distrusting people to trusting them, away from avoidance to confrontation, and away from competition to collaboration.

However, despite the trends toward values consistent with scientific-humanism of the Information Era, it is also clear that, for many people, values from earlier eras are still operational. The fact is that there is a distribution of value systems in American society, and there is a distribution of people holding each value system. This goes a long way towards explaining things like the generation gap where, for example, the parents may be living values from the social value system, the oldest sibling may be living values from the scientific value system, and the youngest sibling may be living values predominantly from the humanistic value system. And, to complete the picture, the grandparents may be living values from the Individual Ethic.

So it is no wonder that people like Warren Bennis are beginning to wonder just how real the movement towards humanistic values and scientific-humanism really is. The strategy of conflict and the realities of power politics are still flourishing in most organizations, observes Bennis, and the transition in values is going to be a lot more painful and slower than he had anticipated a few years ago.

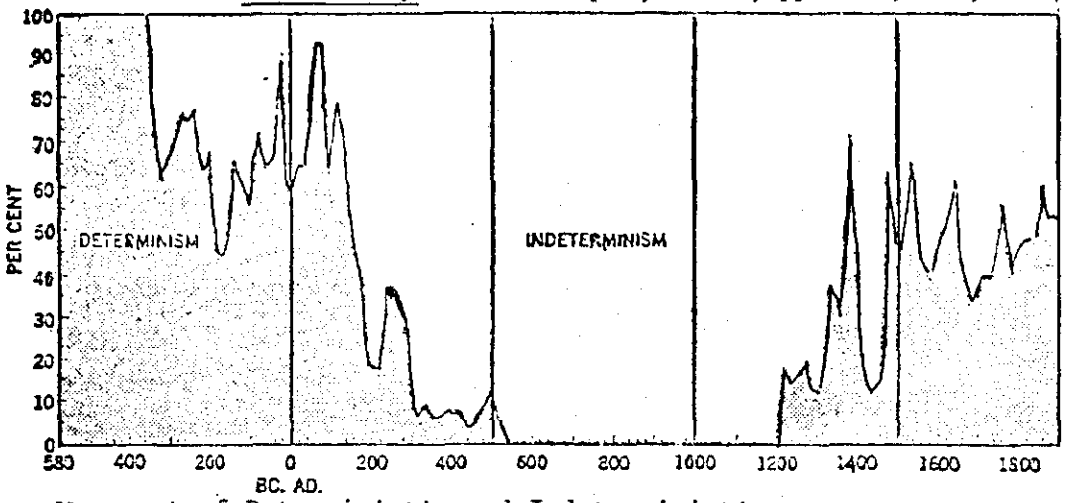
Section 1.6.4: Putting It All Together: The Future of Society

The foregoing discussion has developed the concepts of changing technology and changing value systems as two trends which circumscribe any alternative future for man and organization. To a large extent as a result of these two trends, society is currently in quite a turmoil causing many people to wonder whether we are moving toward the rise or the fall of civilization. History sets a precedent for the latter, and if this in fact is where we are heading, then we had better pay more attention to John Platt's problems and crises than to Herman Kahn's emergent year 2000 society.

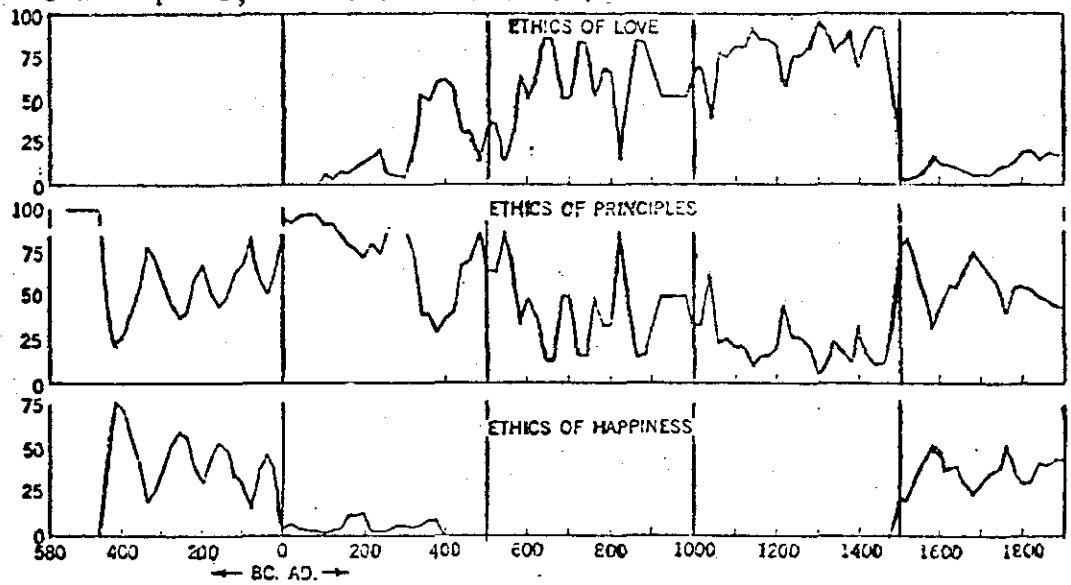
Historians have been able to point out, after the fact, that there were signs of major social upheaval decades -- and sometimes centuries -- before they actually occurred. Arnold Toynbee, in his A Study of History, has tabulated the stages of development, rise, and decline of the major civilizations that have existed on our planet. He has observed patterns of development that are typical for the life cycle of past great civilizations and implies that America could fall as did our Greek and Roman predecessors.

Pitirim Sorokin, in his Society, Culture, and Personality, has analyzed many of the changes in technology and values of human civilization. His curves of technology -- and the extensions developed by Wood -- were discussed earlier. Whereas the curves of technology were clearly exponential, the curves of value (including philosophy, ethics, truth systems) appear to be cyclical or sinusoidal as shown in Figure Seven. The implication of these value curves is that -- if history repeats itself -- U.S. society will follow the cyclical curve, and eventually our value system and civilization will decline.

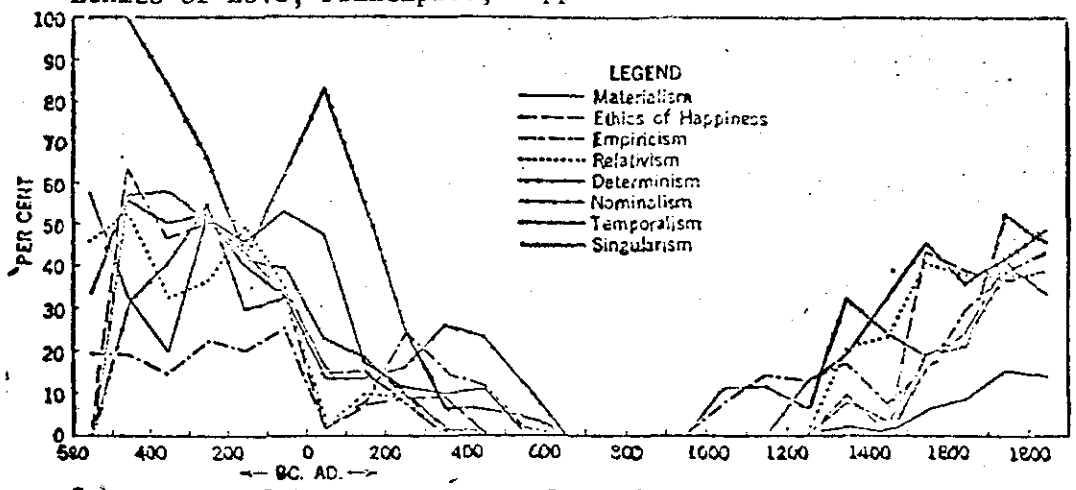
Figure Seven -- Growth Curves of Value
(From Pitirim A. Sorokin, Society, Culture and Personality (N.Y.: Harper, 1947), pp. 624, 630, 631.)



Movement of Deterministic and Indeterministic Philosophies, 580 B.C. to 1900 A.D.



Ethics of Love, Principles, Happiness.



Subsystems of Sensate System of Truth

But as counterpoint, the curves of technological change indicate that the current level and rate of technology is orders of magnitude greater than that of the Greek and Roman empires before they fell. In fact, it seems plausible that the growth of technology into the Information Era together with an upswing in the sociological cycle (curves of value) is a unique and rare coincidence of history.

This new technological era for the first time gives man the "intelligence-amplifying" tools -- such as computers, communication systems, and other technologies -- which, when coupled with new fields -- such as cybernetics, general systems theory, management science, behavioral science, and organization development -- have the potential to help man guide the evolution of society towards a desireable alternative future.

This unprecedented opportunity gives mankind at once a great challenge and a great responsibility. The current social turmoil, instability, and value conflict in American society is one result of the interaction between sociological and technological forces. Our ideals and values are to a large extent disconnected from our social institutions. But a second result is our enhanced ability to learn about these changes so that we can perceive how conscious decisions can guide society towards a new, and hopefully lasting, scientific humanism, if that is what we want to make the future.

Perhaps the tentative model of an Integrative Framework for a New Frontier -- shown in Figure Eight on page 28 -- can help us meet the challenge and responsibility of solving John Platt's problems and crises and achieving Herman Kahn's post-industrial society.

Section 1.6.5: The Future of Organization

Previous sections of this paper developed some of the systemic trends going on in American society -- particularly in terms of changing technology and changing values -- and attempted to show how the cybernetic systems perspective points the way toward the application of such diverse concepts as general systems theory, organizational development, etc. to the solution of social problems and crises and to guiding our ship of state into the choppy seas of tomorrow. The surface was only scratched, from an academic point of view, and in depth analysis will require extensive research and writing. But at least now we have a general framework within which can be examined the various so-called expert extrapolations of the future of organization. I have grouped some of the most common projections below by general category. As will be obvious upon examination, in some cases there is pretty good consensus, but in other cases there is not. But in all cases, the projections do not make much sense unless viewed in a cybernetic systems perspective which ties present and future systems together in some logical framework.

1) All institutions, including business, are accountable for the quality of life, and the attainment of same will have to increasingly be a) considered a business opportunity and b) converted by management into profitable business (Peter Drucker). The organization's response to the environment will continue to be the crucial determinant for its effectiveness (Warren Bennis). Business will be called upon to assume responsibility for the quality of life as well as the quantities of life (Harold Williams). Private markets may play a diminished role relative to the public sector and social accounts (Herman Kahn). There will be a shift in emphasis from production

to the environment (George Steiner). Organization goals and standards are moving from a) short run profits to long term survival, b) from production to a clientele orientation, and c) from primarily economic efficiency to social effectiveness and relevance (Fremont Shull). A major factor of relevance in the modern world is the social responsibility of the organization (Gordon Lippitt).

2) Entrepreneurial innovation will become the very heart and core of management (Drucker). Economic organizations will still be among the most flexible, adaptive, and creative groups in society (Craig Lundberg). Business firms may no longer be the major source of innovation (Kahn). Business will experience a relative decline as primary innovative force compared to education and government (Steiner). Institutional reorganization will encourage greater experimentation, innovation, flexibility, and variety (Shull). Cybernetic organizations will afford greater freedom to innovate and be creative (Ericson).

3) It is management's task to make knowledge more productive. The basic capital resource, the fundamental investment, and the cost center of a developed economy all rest in the application of knowledge, that is in concepts, ideas, and theories (Drucker). Rapid changes in communication systems -- computer video tapes, CATV, computers, etc. -- will bring great change in information systems and decision-making methods (Steiner). The capability of assessing technological change as a whole, including the social, political, and cultural side effects, will improve substantially (Shull).

4) Management will have to be considered as both a science (tools and techniques, concepts and principles) and a humanity (culture and system of values and beliefs). Management may well be the bridge between an integrated worldwide economic civilization and divergent national cultures (Drucker).

Forecasting changing social values will become increasingly important in business appraisals of the environment, and tools for managerial decision-making will be expanded and sharpened (Steiner).

5) Emphasis will be increasingly on the individual (Drucker). Individualism and strengthening of the individual's importance in the social structure will rise. Work must increasingly involve a) autonomy, b) creativity, c) intrinsic satisfaction per se (General Electric). Individual expectation for self-expression and self-fulfillment will increase, and the role of individuals will become dominant (Steiner). Organization has progressed from extrinsic job satisfactions to task intrinsic concerns to expressive concerns and self-actualization and finally to mission-oriented focus as in Maslow's meta-values (Shull). Cybernetic organizations will provide a greater potential for meeting individual needs (Ericson).

6) In the future cybernetic state, the lines between public and private organizations crumble. The government will enter markets previously reserved for private entrepreneurship, but new private institutions will enter arenas hitherto dominated by public bureaucracy (Allen Schick). There will be a growing interdependence of institutions (General Electric), greater inter-organizational transaction (Bennis), and increased government influence on business (Steiner).

7) There will be a continuing need for education and re-learning (General Electric). Education will be a continuous process (Lundberg). We will truly have a learning society (Kahn and Steiner). Education is becoming a lifetime proposition and will be increasingly required to avoid technological obsolescence, prepare for new roles in a changing society, and achieve self-growth and improvement (Lippitt).

8) Shorter tenure will be increasingly prevalent at the highest levels of leadership, and a new breed of interstitial men -- who travel in the temporary, ever-changing, and hazy interorganizational interfaces -- will develop (Bennis). Employees and management alike will be more mobile with double and triple careers commonplace (Eric Trist and Steiner). There will be greater inter-organizational mobility (Ericson).

9) Large scale public and private bureaucracies will become more vulnerable than ever before to an infusion of legislative and judicial interventions (Bennis). The structure of organization in the cybernetic age will enhance the opportunities for individual participation (Schick). There will be more effective democratization of the organizational system (Shull). There will be increased emphasis on democracy, the freedom of thought, action, and participation in decisions that effect one's own concerns (Ericson).

10) New organizational roles will develop emphasizing different loci of commitments and different reference groups (Bennis). Multidisciplinary and multiple experience groups will be more common (Lippitt). Cybernetic organizations will have the potential for greater intra-organizational mobility, more "ad-hoc" groups formed on a voluntary basis, more opportunity for spontaneous collaboration, and greater loyalty to an extra-organizational focus such as professional groups (Ericson).

11) There will be increasing emphasis on organization development (adapting company to the needs, aspirations, and potentials of invididuals) rather than management development (adapting the individual to the demands of the organization) (Drucker). The need for organization renewal in relating an organization's technology, structure, and people to the problems confronting the organization will be compelling (Lippitt).

Section 1.6.6: An Integrative Framework For A New Frontier

Figure Eight -- An Integrative Framework For A New Frontier: A Tentative Model

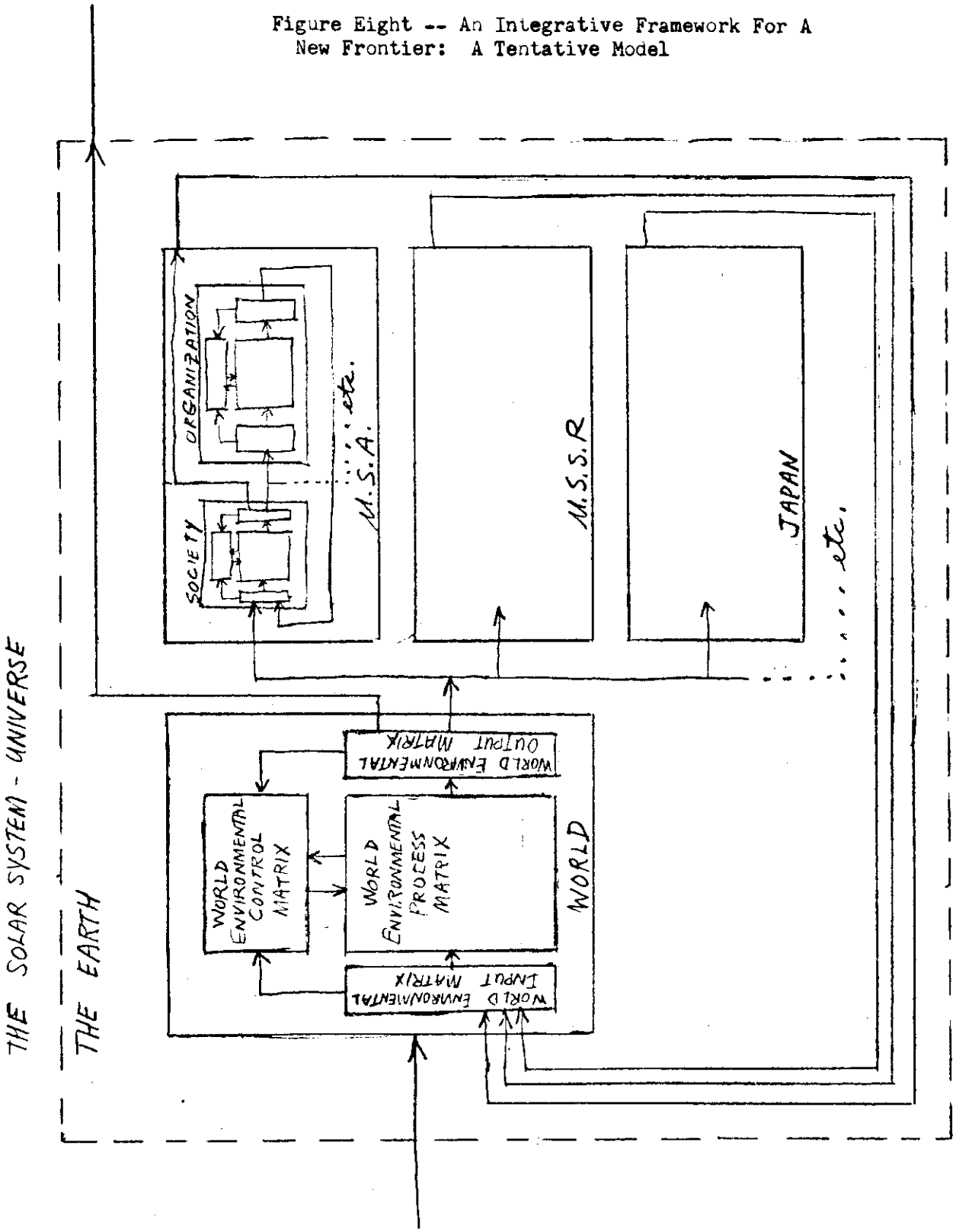
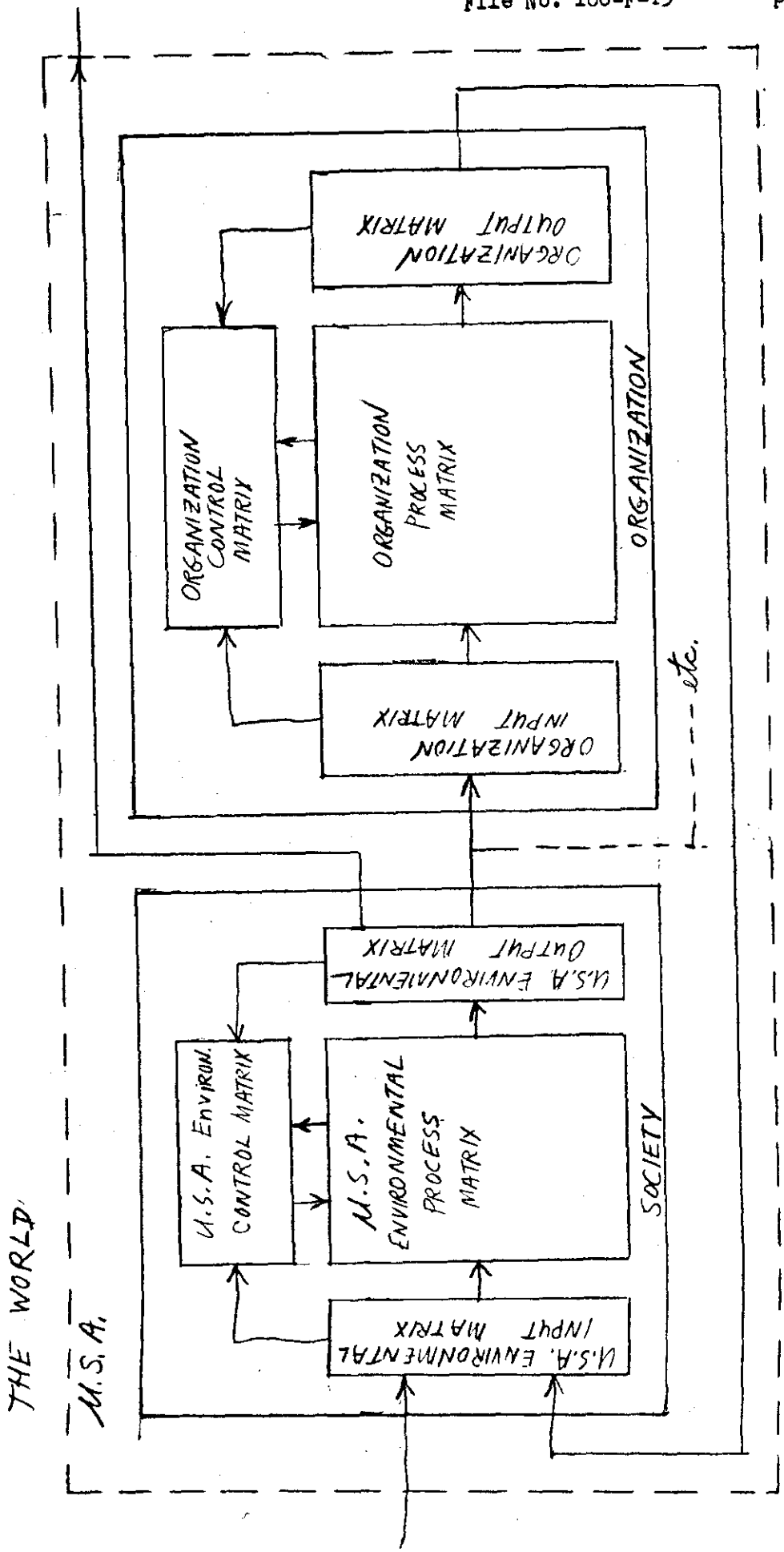
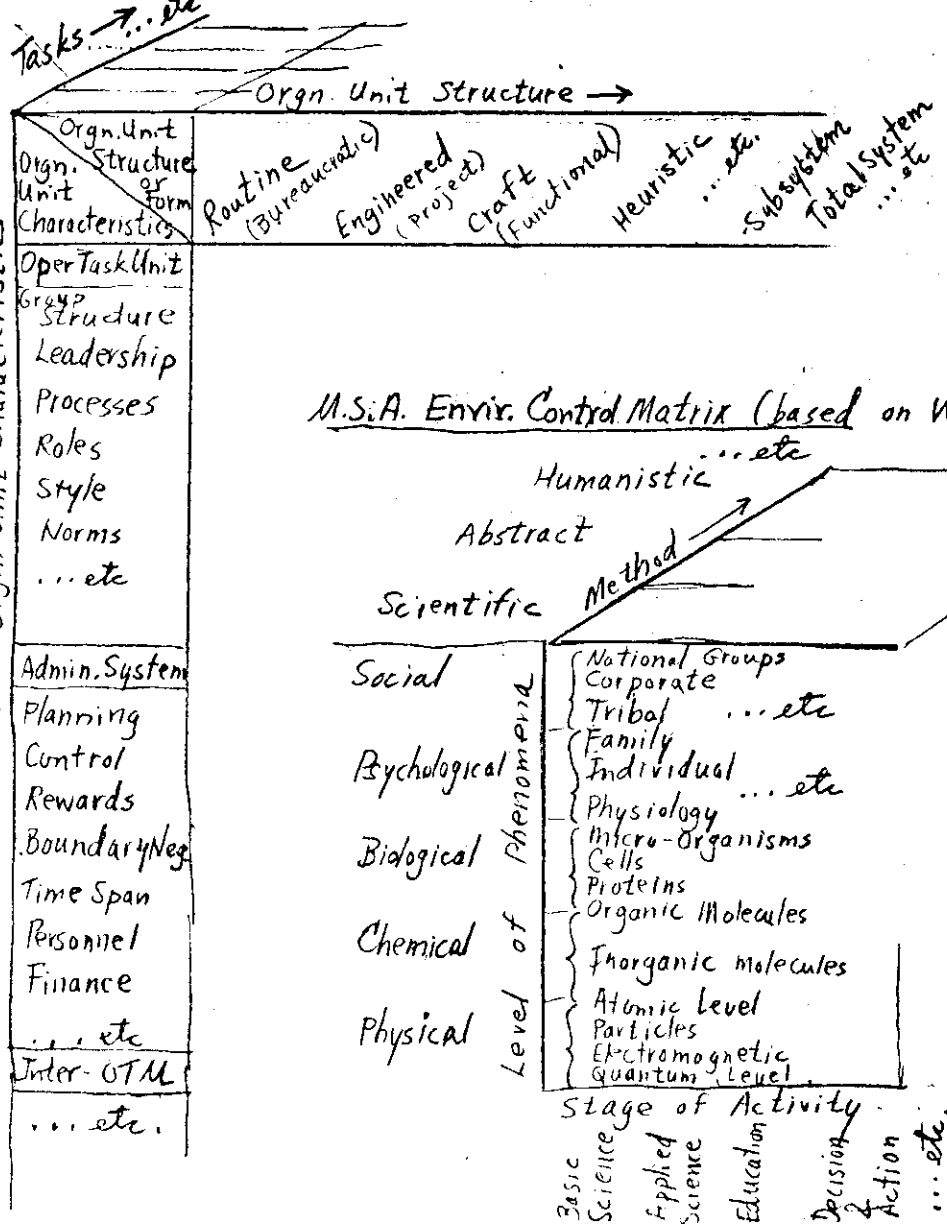


Figure Eight(continued)

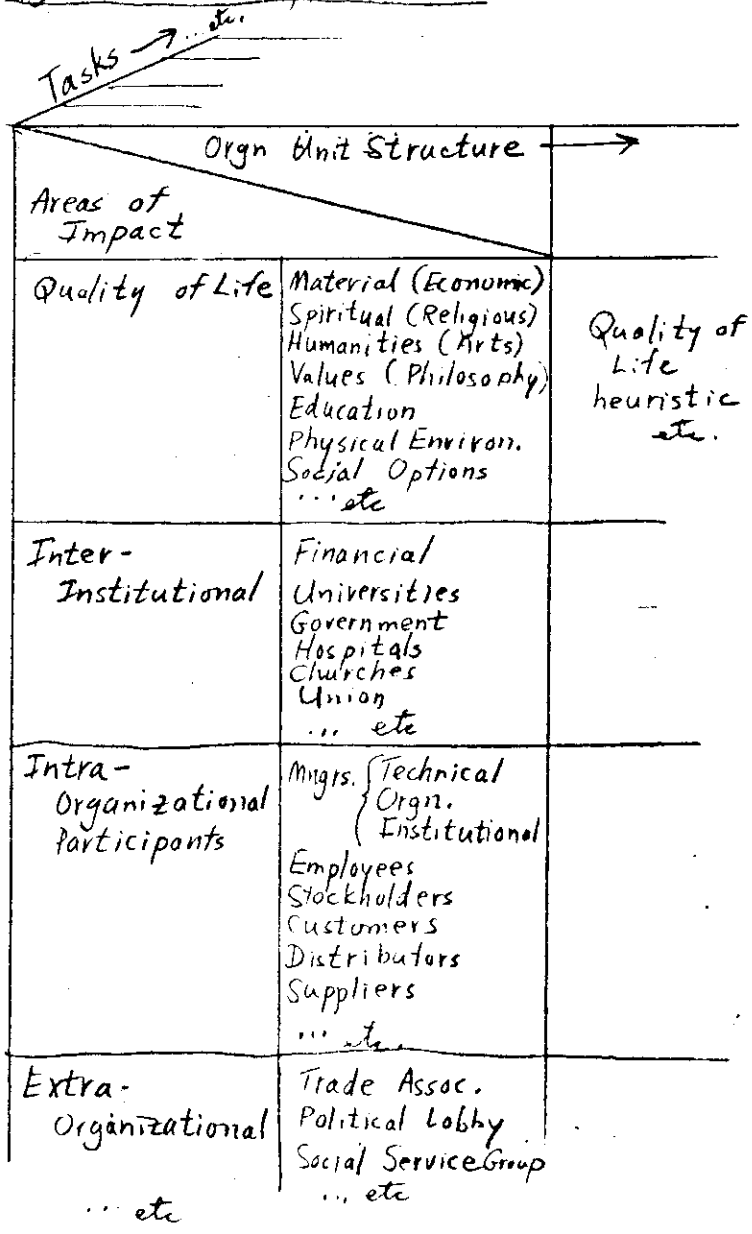


Organization Process Matrix (based on Shull)



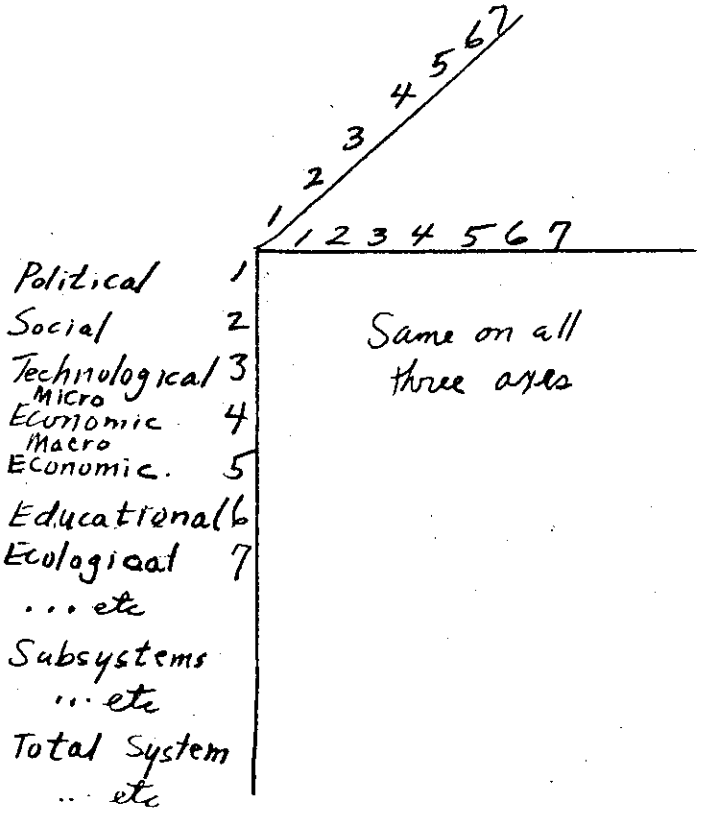
M.S.A. Envir. Control Matrix (based on Wood)

Organization Output Matrix (based on Ericson)

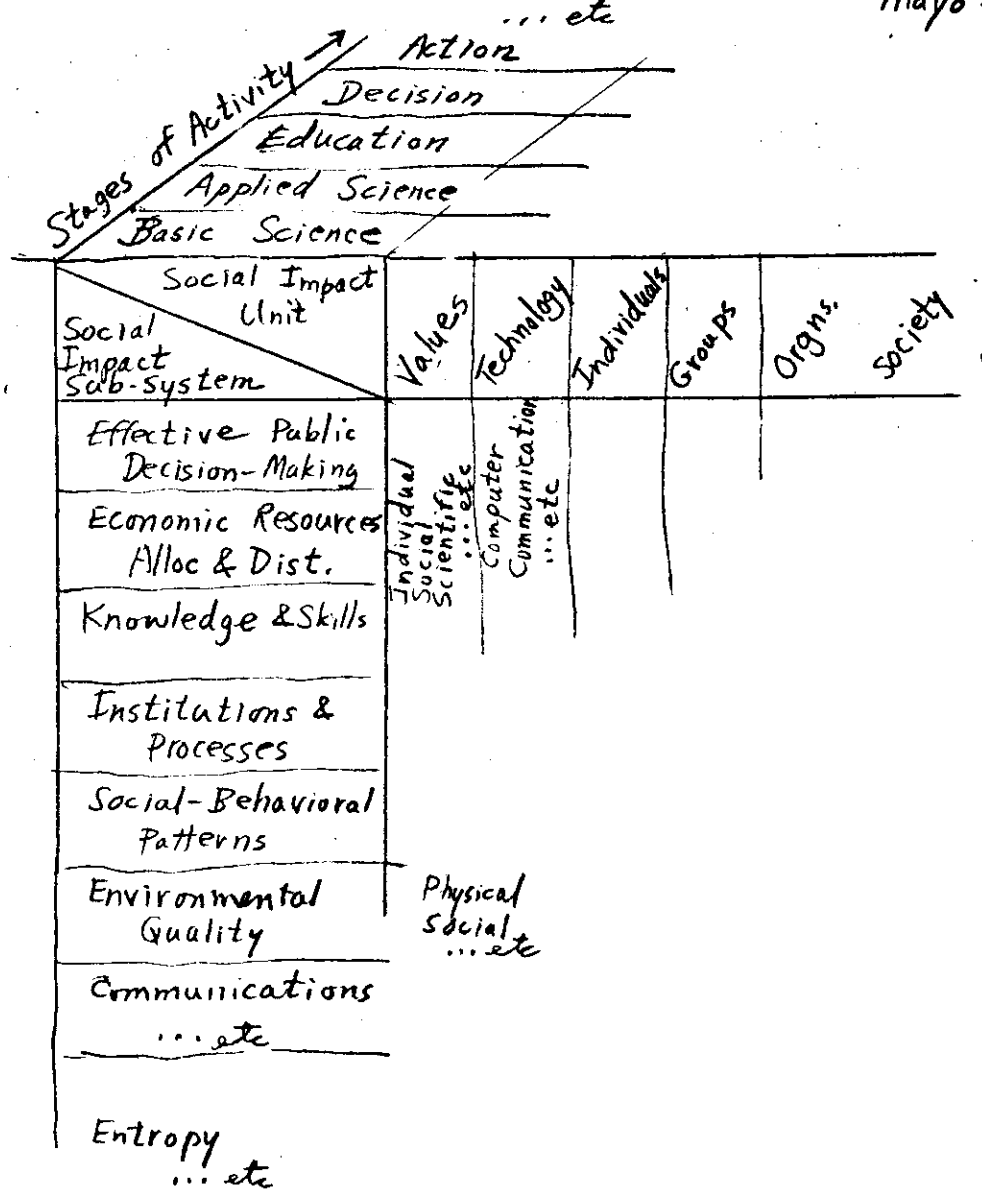


Examples of Matrices in Figure Eight (3-dimensional shown; n-dimensional are also possible, but are very difficult to draw)

U.S.A. Environmental Process Matrix



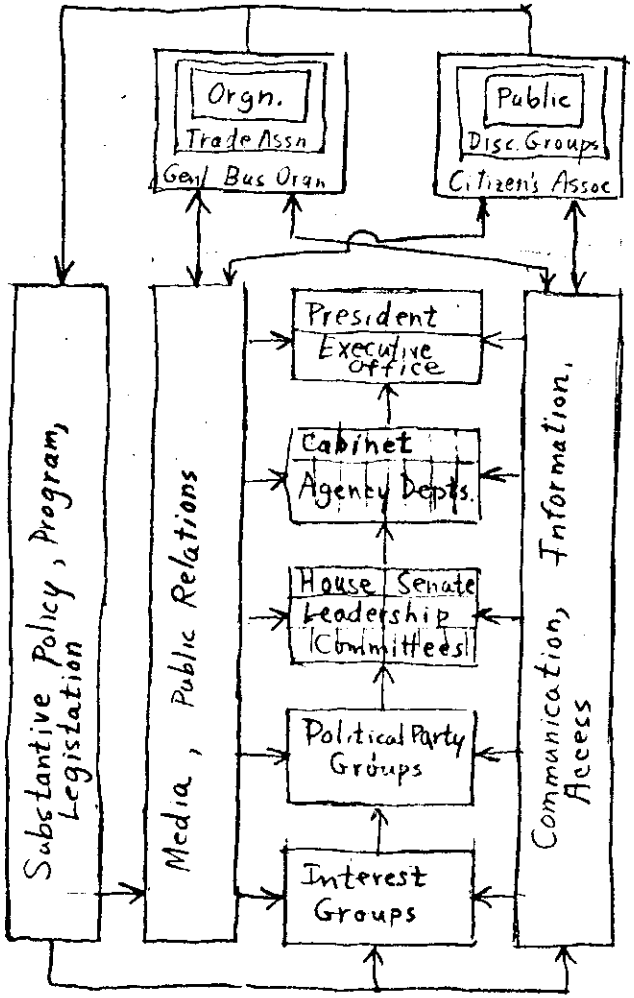
Another U.S.A. Environ. Control Matrix (based on Mayo & Wood)



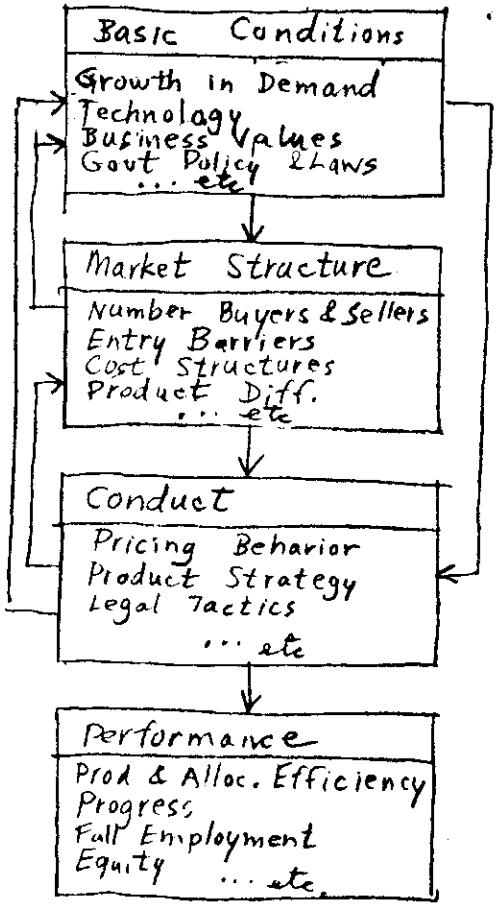
Examples of Process Subsystems

U.S.A. ENVIRONMENTAL

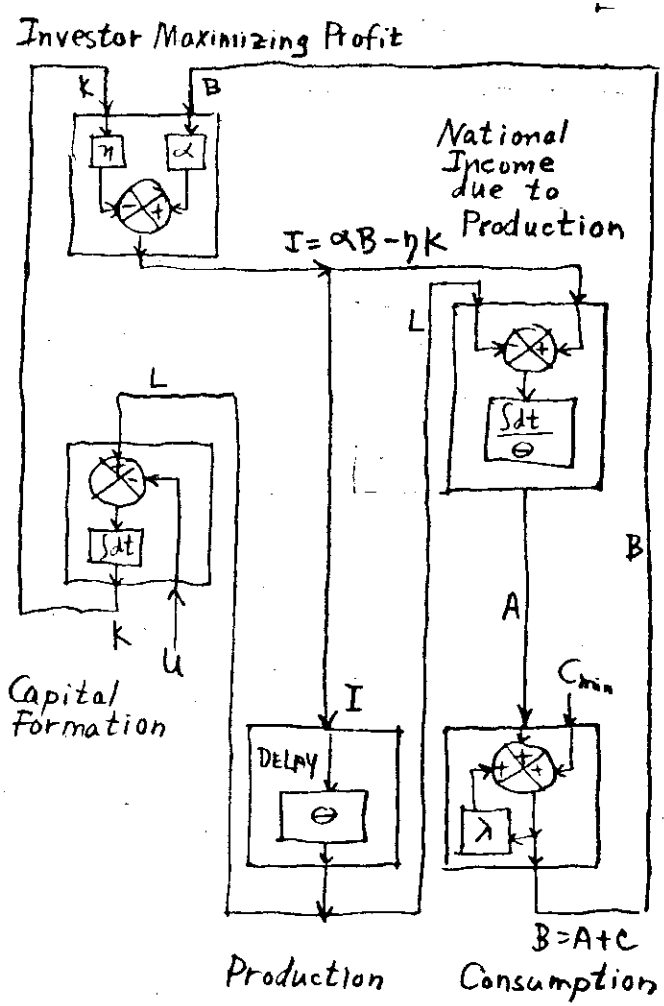
(1-1-1) Political-Simplified
(based on Cherington & Wood)



(4-4-4) Micro Economic
(based on Scherer)



(5-5-5) Macro Economic-Simplified
(based on Wood)



(Similar subsystems for organizational processes etc.; also for total systems ie. bio-social evolution etc.)

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