

DATABASE STRUCTURE FOR CONNECTING SYSTEMS THEORY
WITH SCIENCE AND POLITICAL ACTION, PART I.

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Abstract: A series of developments from 1941 to 1994 of database structures to facilitate interdisciplinary communication are reviewed. In 1941 a group of engineers developing RADAR at the MIT Radiation Laboratory had lunch at the Technology Christian Association (YMCA) at irregular times to discuss the philosophical and sociological implications of their work. One engineer continued the theme for 53 years. The 1941 discussions led to reinventing the charts of Auguste Comte, Lester Ward and other sociologists. In 1957 a 2-dimensional chart was developed to facilitate an individual engineer in developing a perspective of his work in society. In 1965 a 3-dimensional chart was developed to aid an engineer develop a perspective of the domain of sociology and for use in a quasi-completeness test. In 1979 3-dimensional chart was developed that was compatible with J. G. Miller's *Living Systems*. In 1994 an expanded 3-dimensional chart was developed to aid engineers and environmentalists to use systems theory to bring their work up to a capability of cooperatively challenging the establishment climate scientists and geophysicists to focus on the more important problems that affect the survival of human civilization.

Keywords: interdisciplinary, communication, philosophy, sociology, engineering, climate, geophysics, completeness.

Science and Crises

When crises develop which threaten the survival of human civilization, the organization of science and engineering normally shifts to a different mode to respond to the crisis. In 1940 the MIT Radiation Laboratory was a prime example of such a reorganization. Since the work at MIT was classified as SECRET they did not have to explain things to the public. Internally some of the regular MIT staff called our engineering group "grave diggers and baby snatchers," because we went outside the normal channels of command to get urgent problems solved. We were successful in developing and getting into production the SCR-584 which successfully shot down 95% of the German V-1 Rocket Bombs upon installation in England.

Now we have a crisis threatening human civilization which is recognized only by a scattering of scientists and retired engineers who successfully solved major problems fifty years ago in World War II. This crisis is the decline of the minerals (including trace minerals) of the soil in the great plain agricultural areas of our planet. (Enough minerals are collected by the river delta areas to maintain a sample of the living species on the planet, if they don't kill each other off fighting for scarce resources.) This crisis would normally be taken care of by natural feedback control systems such as the glaciation cycle of 70,000-120,000 years which would leave enough rock dust ground up by the glaciers for the next interglacial warm period of 10,000-12,000 years. This cycle may be modified by the CO₂ added to the atmosphere by our industrial society, by the change

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in cloud structure by particulates from fossil fuel burning, and the ozone hole caused by chlorine and fluorine compounds. The ozone hole may allow ultraviolet waves to inhibit the growth of new trees needed to help control the CO₂.

The purpose of this new data base structure is to open the gridlock conditions which are preventing the interdisciplinary communication on critical problems facing our civilization.

New Database Structures for Interdisciplinary Communication

In 1957 a 2-dimensional database structure was developed to (a) help in evaluating how the engineering work of an individual engineer cuts across boundaries of special fields (Fig. 1), and (b) how an engineer can use the database structure to find what other specialists in other fields are needed to deal with the social impact of new engineering work (Fig. 2).

Engineering Evaluation Structure (Fig. 1)

Crosshatched areas on chart indicate areas covered by a particular analysis, project, or individual. Certain basic types of natural phenomena are arranged in horizontal rows in vertical order such that each is dependent upon the types of phenomena below it.

The basic types of activities required for the meeting of human needs in an industrial society are arranged in order such that the accomplishment of an objective is dependent upon stages reached in activities to the left.

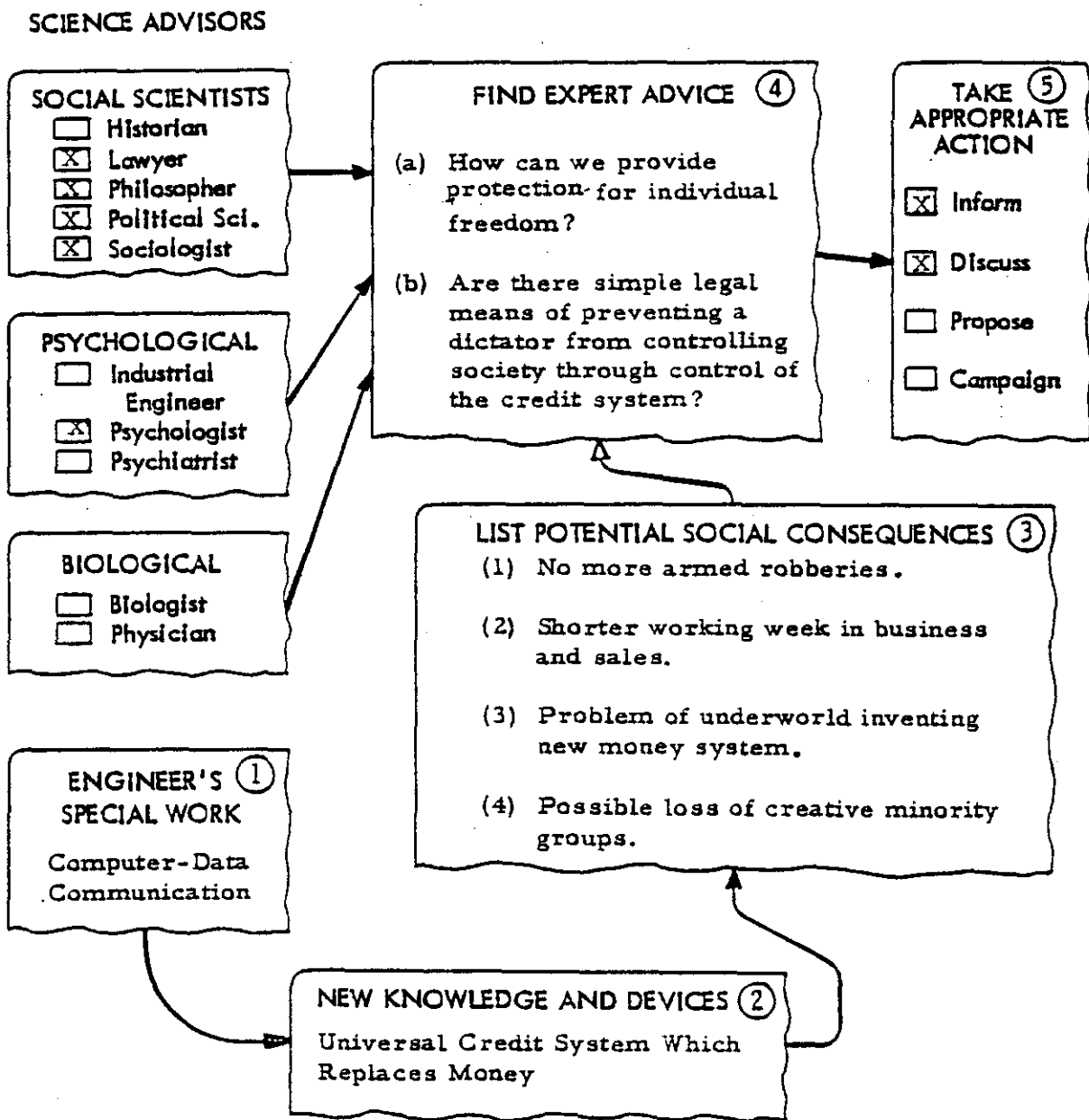
Overlay for Finding Needed Additional Specialists and Selecting Action (Fig. 2)

Figure 2 is an overlay that can be superimposed over Figure 1 for use in checking the potential consequences of a cashless society, where all transactions are made electronically on computer-communications systems. One can trace steps (1) through (4) to find expert advice. The column of science advisors on the left of Fig. 2 is an expansion of column one of Fig. 1 (basic science). Step (5) on the right indicates choice of levels of appropriate action on the problem.

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TYPES OF PHENOMENA	TYPES OF ACTIVITY			
	BASIC SCIENCE	ENGINEERING SCIENCE	EDUCATION	ACTION
SOCIAL			<div style="border: 1px solid black; border-radius: 15px; padding: 5px; background-color: #e0e0e0;"> 4. Steinmetz: Economic Distr. Elec. Power: Capitalist 2. Steinmetz: Political Action: Socialist </div>	
PSYCHOLOGICAL				
BIOLOGICAL				
CHEMICAL	<div style="border: 1px solid black; border-radius: 15px; padding: 5px; background-color: #e0e0e0;"> 1. Steinmetz: Mathematical and Engineering work </div>			
PHYSICAL				<div style="border: 1px solid black; border-radius: 15px; padding: 5px; background-color: #e0e0e0;"> 3. Steinmetz: Econom. Implications of Elec. Power Technology </div>
	Natural Laws	Techniques and Responsibility	Dissemination of Ideas	Organization

Fig. 1. Checking Chart to indicate the extent to which a particular analysis covers the possible phases of a general problems.



A SAMPLE USE OF THE CHECKING CHART

Figure 2

Special Database Structure to Help Engineer
Develop a Feeling for the Sociological
Environment Around His Work

Are you concerned about the social implications of new technology? Here is an approach developed in 1965 for an engineer working in new technology to develop a multidisciplinary background. Look at Fig. 3 as a method of relating the interaction of levels of phenomena (physical through social), classes of activity (basic science through decision & action), and methods (scientific, philosophical, and intuitive).

Fig. 3 [3] shows a trace of questions woven through three dimensions of levels of phenomena, classes of activity, and methods. The questions are listed in Table I. The references are keyed to the arrows in Fig. 3 by the entries in Table II.

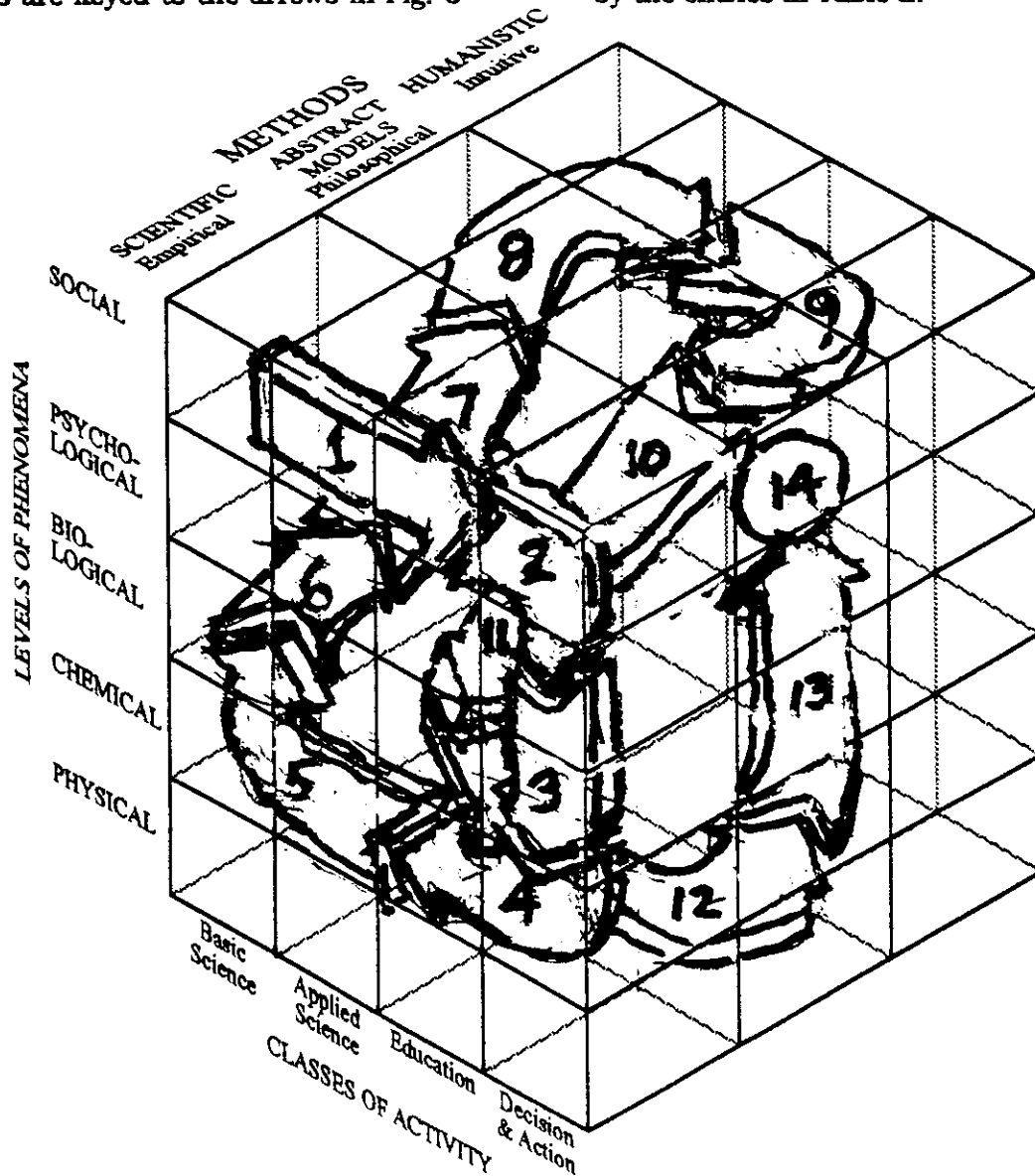


Fig. 3 Dimensional Database Structure
Based on: Phenomena, Method, and Activity Class

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TABLE 1: QUESTIONS ONE THROUGH FOURTEEN,
WOVEN THROUGH PHENOMENA, ACTIVITY AND METHODS.

The coding of reference numbers and slide numbers is defined in Table II

ARROW OR POINT	STATEMENT OR QUESTION	References in Table II.
1.	Let us use the modern version of charts (1Ah) used by pioneer sociologists with the intellectual craftsmanship of C. Wright Mills (1Bi). Slides L3, S15.	
2.	Next let us look for applied sociology, as engineering is related to physics and chemistry. We only find incomplete attempts (2Ah, 2Bh, 2Ch). Slide S11.	
3.	How can we find isomorphic laws and concepts tying together social, biological and physical phenomena which enable us to develop the sociological engineering techniques needed to protect and develop peace & freedom. (3A-C) S53.	
4.	What empirical limits on electrical and human communication systems restrict the education process of applying new concepts? S29(Ref.4Ai).	
5.	What more fundamental process underlines all levels of phenomena? — negative feedback loops of cybernetics. (Ref. 5At, 5B3) L4.	
6.	What does an engineering feedback loop look like and what is its behavior that has analogies in fields relevant to sociological studies? S34, S37 (Ref. 6Al, 6Bt, & 6Ce)	
7.	How do these negative feedback loops appear in psychology? (Ref. 7Ae, 7Bi)	
8.	How do these feedback loops determine the stability of economic and political systems? (Ref. 8Al, 8Be) Automation and matrices. (GD)	
9.	Is there a fundamental ethical principle to which we can refer our sociological studies of peace and freedom? -- Can we use Albert Schweitzer's concept of "reverence for life"? (9Ae) L4. Are we neglecting human values in the quantitative society? GE	
10.	What fundamental concept of physics and chemistry is most significant to the life process?—decreasing entropy in a local system (Ref. 10Ae) L17, L18	
11.	Does the combination of Albert Schweitzer' ethical principle with Schroedinger's definition of the life process lead to a more rigorous equivalent of Immanuel Kant's "categorical imperative"? —namely the "Thermodynamic Imperative". L11 (Ref.11Ae)	
12.	Does the "Thermodynamic Imperative" implemented with a discrete channel model from electrical communication theory give us a measure for comparing different social systems such as democracies and dictatorships? (Ref. 12At) L12. Does this also give us a chance to find an ethical base for solving the population explosion problem?	
13.	Does a different model from electrical communication theory, namely the continuous channel, give us a measure of a balance between freedom and stability--"dynamic-justice". (Ref. 13At) L13	
14.	Can we use this property of "dynamic-justice" and its associated political ideas distribution function to help us in international relations and in particular to aid in determining then disarmament is practical? L14. What symbols or concepts will be the core of the ideology for the "information era" or the noosphere? S30.	

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TABLE II: REFERENCES USED IN FIG. 1 & TABLE I.

The references such as "1Ah" are defined by the first character (a number) being the point or arrow in 3-dimensional space, the second character (a capital letter) indicates the reference where there are more than one reference for one point in the diagram, the third character (a lower case letter) indicates the technical level of the reference, such as "e"= elementary, "h"= historical, "i"= intermediate, "t"= technical. "S,L,G" numbers refer to slides used in lectures at Stanford, London, and Georgetown in 1964.

- 1Ah. Lester Ward. Pure Sociology. (1908)
- 1Bl. C. Wright Mills. The Sociological Imagination. (1959)
- 1Cl. F.B. Wood. "How is Your Sociological Imagination?", SEPR No. 28-B, May 2, 1965
- 2Ah. Eugen Rosenstock-Huessy. Out of Revolution: An Autobiography of Western Man, trans. from German (1938).
- 2Bh. Simone Weil. The Need for Roots. trans. from French. (1955)
- 2Ch. Fritz Pappenheim. The Alienation of Modern Man. (1959)
- 3Ah. Daniel Bell. The End of Ideology. (1960)
- 3Be. Isaac Asimov. The Genetic Code. (1963)
- 4Al. James G. Miller. "Information Input Overload and Psychopathology" American Journal of Psychiatry. Vol. 116, No. 8, Feb. 1960, pp. 695-704.
- 5At. Norbert Wiener. Cybernetics. (1948)
- 5Be. G. T. Guilbaud. What is Cybernetics? trans. from French (1960)
- 6Al. W. R. Ashby. An Introduction To Cybernetics.
- 6Bt. Tsien. Engineering Cybernetics.
- 6Ce. Norbert Wiener. The Human Use of Human Beings. (1954)
- 7Ae. Neville Moray. Cybernetics. (1962) Vol. 131 in the Twentieth Century Encyclopedia of Catholicism.
- 7Bl. Fred Attneave. Application of Information Theory to Psychology. (c. 1955)
- 8Al. Lawrence Rj. Klein. An Introduction to Econometrics. (1962)
- 8Be. Karl Deustch. The Nerves of Government. (1963)
- 9Ae. Albert Schweitzer - An Anthology. Boston (1956), p. 256.
- 10Ae. Erwin Schrodinger. What Is Life? (1944)
- 11Ae. R. B. Lindsay. The Role of Science in Civilization. (1964)
- 12At. F. B. Wood. "Negentropy and the Concepts of Freedom, Democracy and Justice," SEPR No. 88-B. Cleveland: A.A.A.S.-S.G.S.R. Meeting, Dec. 27, 1963.
- 13At. F.B. Wood. "A General Systems Theoretic Model For The Estimation Of The Negentropy Of Sociological Systems Through The Application Of Two Isomorphic Electrical Communication Networks," SEPR No. 92- B. London: First International Congress of Social Psychiatry, . August 19, 1964

Database Structure for Facilitating Communication
between Different Science, Engineering
and Political Action Groups

A multipurpose database three-dimensional structure is proposed for keeping track of multidisciplinary problems. It can be used in designing a systems library, in document retrieval for multidisciplinary projects, and as a quasi-completeness test for evaluating a proposed computer simulation. This system is an extension and modification of my paper in the SGSR Proceedings of 1979 [4]. In a second paper this system will be used to test for completeness of a particular analysis of climate change and for completeness of covering the seven interrelated imperatives in the general call for papers. In this first paper the use of the coordinate system will be illustrated by a representation of a systems library built on these principles.

The x-y-z Coordinates are:

x=A(Philosophy), =B(Spirituality), =C(Science), =D(Decision Theory),
=E(Engineering Analysis), =F(Tools and Production), =G(Emergency Action);

y=T(Astrophysics & Cosmological Evolution), =U(Physical/ Chemical Evolution),
=V(Geophysical Evolution & Cycles), =W(Biological Evolution), =X(Sociological Evolution
& Cycles), =Y(Technological Evolution), =Z(Conscious Coevolution with the Biosphere);

z=1(Etheric Waves), =2(Physical Phenomena), 3(Chemical Phenomena), 4(Biological
Phenomena), 5(Psychological Phenomena), 6(Sociological Phenomena), =7(Global &
Space Phenomena).

Books would be indexed by the code: xyz, which would locate the book by shelf, and position on the shelf within 7". 9"x48" bookshelves in a frame 4' wide, 14' long with 7 columns of shelves, and 8' high, would allow the organization of reference books in an optimum way to facilitate multidisciplinary research. The books stored this way can be listed in a computer display that shows where the books are on virtual shelves with call numbers referring to the actual location of the books in a system without this proposed organization.

Recent information on abnormal cloud formations led to a search for methods of weather modification. Two active groups working successfully on producing rain in deserts or over the ocean with insufficient humidity for normal rain claim to be using "etheric waves" which don't appear in physics handbooks.

For quasi-completeness a level marked "etheric waves" has been added to Fig. 4.

We have some reservations about using "etheric waves" for climate change until we have a better understanding of the nature of "etheric waves." It is possible that the energy-carrier etheric wave use for climate modification might destroy components of the "information-carrier etheric waves" that Hindu philosophers claim to be using in their work to insure that the best information developed by present human civilization is not lost during the coming ice-age. This will be discussed further in Part II of this report.

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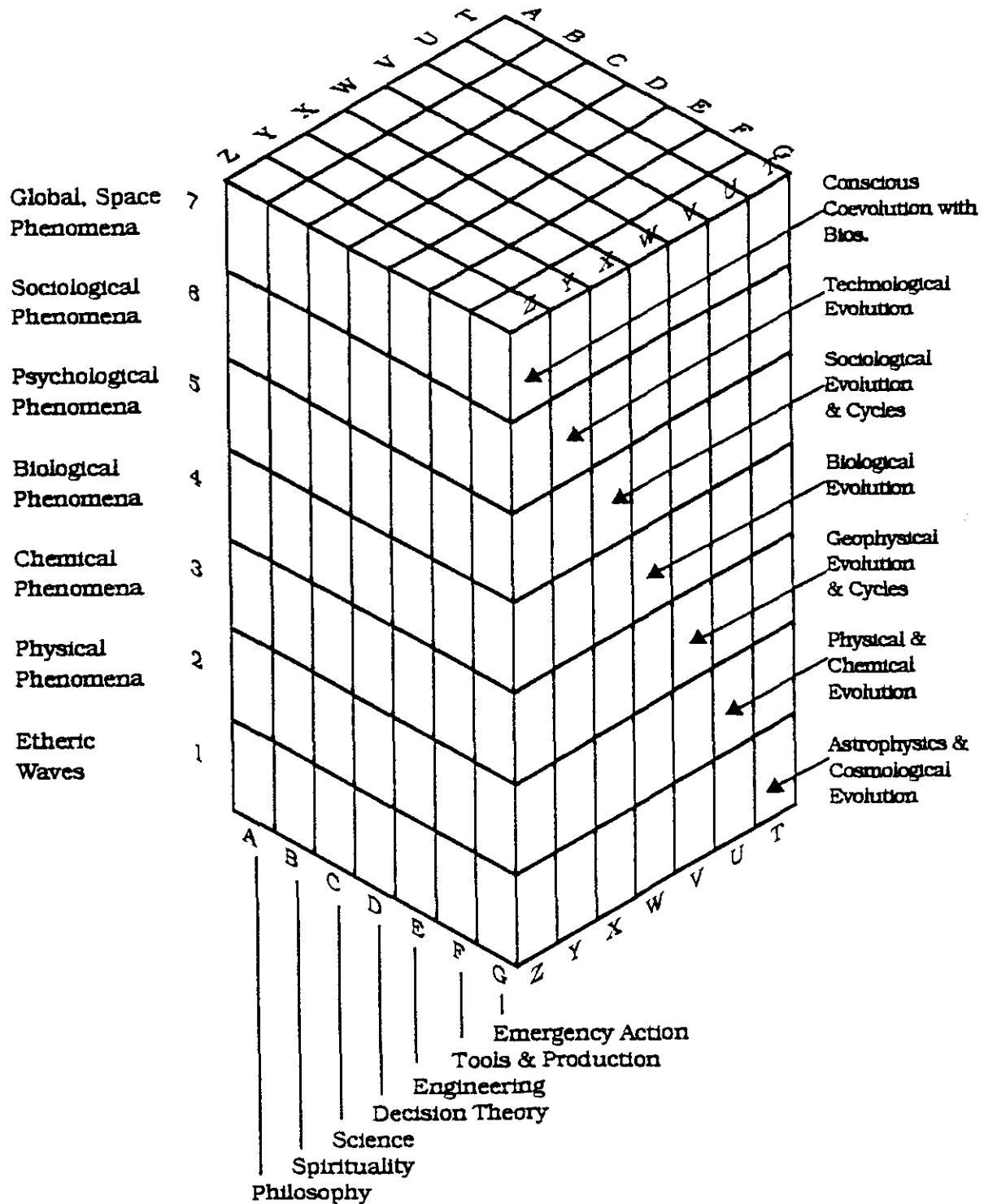


Fig. 4: Alternative Database Structure for Coordinating Complex Projects Relating to the Survival of Human Civilization (Year 1994)

- [1] Frederick B. Wood, "The Nature of the Social Responsibility of Engineers," Socio Engineering Problems, No. 1, August 1958, San Jose, California, pp. 3-14.
- [2] Fred B. Wood, "The Social Responsibility of Engineers and Computer Scientists." Proc. of the Western Joint Computer Conference, August 1958. Reprinted by Society for Social Responsibility in Science, Pamphlet No. 6, 1960.
- [3] Frederick B. Wood, "How Is Your Sociological Imagination?" SEPR No. 28-B, May 2, 1965.
- [4] Frederick Bernard Wood, "A Proposal for a Quasi-Completeness Test of General Systems Theories Using Computer-Conferencing and Computer Data Base Searching Coordinated with a Public Museum Exhibit Structure," 10 pages in Proceedings of the Society for General Systems Research, London, England, August 20-24, 1979. Reprinted by SGSR SIG PHILOSOPHY/THEORY, Reprint No. XDE006A. Reprinted in COMMUNICATION THEORY in the CAUSE of MAN, Vol IV, No. 1, pp. 7-16 (BOOK SECTION 2.8.0, UPDATE F-25), P.O. BOX 5095, San Jose, CA 95150 USA, June 24, 1979.
- [5] James DeMeo, "Cloudbusting, A New Approach to Drought," Pulse of the Planet, Back Issue No. 1, Spring 1989, Orgone Biophysical Research Lab, PO Box 1395, El Cerrito, CA 94530.
- [6] Trevor James Constable, Cosmic Pulse of Life. Revised and enlarged edition 1990. Borderland Sciences Research Foundation, P.O. Box 429, Garberville, CA 95440.