1937: AN ESSAY ON PERSPECTIVES

by June Andel

In part, this is my personal commemoration of the 50th anniversary of the publication of H. G. Wells' World Brain. In addition, it exemplifies what I would like a "universal encyclopedia" to do for me--the average curious citizen seeking information. Because it involves historical information, it should be easy for currently-available technologies to achieve. As all reference librarians appreciate, yesterday's information is easy to locate and organize; the real challenge lies in solving today's problems and trying to anticipate tomorrow's.

The delivery by H. G. Wells of each of the speeches and essays collected in the World Brain volume represents a pinpoint in time at which occurred an intersection of the horizontal axis called "the year 1937" and the vertical axis called "the man Wells." Does an analysis of the points on these axes contribute to one's understanding of the significance of the moment of intersection?

THE YEAR 1937

What was it like to be in England in 1937? What headlines leapt out at you from The London Times during your breakfast tea?

*Against a backdrop of the Spanish Civil War which Generalissimo Francisco Franco had initiated late in 1936, President Franklin Delano Roosevelt was inaugurated for his second term of office (Jan. 20), along with Vice-President Garner. Neville Chamberlain succeeded Stanley Baldwin as British prime minister (May 28), under King George VI.

*The defenseless Basque town of Guernica was annihilated by German bombers supporting Spanish nationalists (April 26), inspiring the Picasso painting which was displayed at the Spanish Republic's pavilion at the Paris World's Fair. In Moscow, Josef Stalin was purging the Communist party and the Soviet army of alleged Trotskyites.

*In the East, Burma became a separate entity in the British Empire (April 1), and fighting between Chinese and Japanese troops near Peking (July) began an undeclared war which lasted until 1945. The Panay incident produced tension between Japan and Britain and the United States.

*In Latin America, 10-20 thousand Haitians were killed in Dominica, and General Anastasio Somoza became President of Nicaragua.

*Pope Pius XI issued the Encyclical Mit brennender Sorge on Nazism (March 18). Germany's Buchenwald concentration camp was opened (July 16), and German Jews were evicted from trade and industry and ordered to wear yellow badges displaying the Star of David.

*At Columbia University, Austrian-American physicist Isidor Isaac Rabi invented a magnetic resonance method for observing the spectra of atoms and molecules in the radio-frequency range. Italian physicist Emilio Gino Segre, working with Enrico Fermi, produced the first laboratory-made element, to be called technetium. Diabetics were treated successfully for the first time with zinc protamine insulin. General Motors introduced an automatic transmission for automobiles under the name Hydramatic Drive, similar to transmissions used on London buses for 12 years. Standard Oil Company of New Jersey drilled the first offshore Louisiana oil wells.

*John D. Rockefeller died (May 23) at age 97. Andrew W. Mellon died (August 26) at age 82. U. S. aviatrix Amelia Earhart disappeared on a Pacific flight from New Guinea to Howland Island (July 2). San Francisco's Golden Gate Bridge opened (May 27), despite an accident which killed ten workmen during its construction (Feb. 18).

*Nylon was patented by E. I. duPont's W. H. Carothers. The "jet engine" was invented. Xerography was invented. Newsweek, Look, Woman's Day, and Popular Photography magazines began publication. Spam, Pepperidge Farm bread, and Kix cereal were introduced, and Britain got her first frozen foods. The A&P began opening supermarkets, and Howard Johnson restaurants became franchised.

*George Gershwin died of a brain tumor (July 11) at age 38. The big hit on Broadway was Room Service (starring Sam Levine, Eddie Albert, and Betty Field) and, in London, Me and My Gal. The songs that were popular included "That Old Feeling," "Once in a While," "The Nearness of You," and "Moon of Manakoora."

THE MAN WELLS

He was born in 1866 to domestic servants who became small shopkeepers. After a frustrating youth marked by ill health, several weak attempts to break away from the "lower class" of his birth, and a search for the perfect love partner (which was to continue most of his life through two unsuccessful marriages), he hit upon an unique writing style which brought him great success at the age of 29. A combination of his lively and humorous style and the smattering of knowledge he acquired at the Normal School of Science in London created a new genre, the scientific romance, making Wells the father of science fiction. If he had stayed with this early style, instead of continually reaching for greater challenges, he might have achieved no less fame, but we would have missed the fruits of his many later levels of development.

The following partial bibliography indicates the kind of writing he was doing at different stages in his long career:

Scientific Romances and Short Story Writer, 1895-1901	The Time Machine (1895), The Invisible Man (1897), The War of the Worlds (1898), When the Sleeper Wages (1899), The First Men in the Moon (1901)
Serious Novelist, Prophet and Planner, 1901-1910	Anticipations (1901), The Discovery of the Future (1902), Mankind in the Making (1903), A Modern Utopia (1905), First and Last Things (1908), The War in the Air (1908), Ann Veronica (1909)
Years of Stress, 1911-1915	The New Machiavelli (1911), Marriage (1912), The World Set Free (1914)
Theological Phase, 1915-1919	Mr. Britling Sees it Through (1916), God the Invisible King (1917), The Undying Fire (1919)
The Reconstructor, 1918-1930	The Outline of History (1920), Russia in the Shadows (1920), The Salvaging of Civilization (1921), A Year of Prophesying (1924), Democracy Under Revision (1927), The Way to World Peace (1930)
World Figure, 1930-1940	The Science of Life (1931), The Work, Wealth, and Happiness of Mankind (1932), The Shape of Things to Come (1933), The Stalin-Wells Talks (1934), Experiment in Autobiography (1934), The Anatomy of Frustration (1936), World Brain (1938), The Fate of Homo Sapiens (1939), The New World Order (1940)
Last Years, 1941-1945	Guide to the New World (1941), The Outlook for Homo Sapiens (1942), Mind at the End of Its Tether (1945)

INTERSECTION

We see in the Wells of 1937 a seventy-one year old man, in a position of international prominence, who agonized through World War I, was sensitive to the deteriorating state of world affairs, and genuinely tried to contribute to their improvement. He would have liked us to take him very seriously.

Sources: Chronology of World History; The People's Chronology: a Year-by-Year Record of Human Events from Prehistory to the Present (1979); Encyclopedia Britannica; Dickson, Lovat: H. G. Wells--His Turbulent Life and Times (1969).

Prepared for distribution at SIG Session, "MIDWIFING THE WORLD BRAIN: 50th Anniversary of Publication of the H. G. Wells Classic", Annual Meeting of the American Society for Information Science, Boston, October 6, 1987.

MIDWIFING THE "WORLD BRAIN"

ASIS Annual Meeting, Boston
October 6, 1987

BIOGRAPHIES OF PANELISTS

H. J. A. GOODMAN (M.A., Modern History, U. of British Columbia, Canada; M.Ed., Harvard; Ed.D., U. of California, Los Angeles) Professor, Dept of Curriculum and Instruction, in Educational Media and Technology, U. of Calgary, Canada, until retirement in 1983 as Professor Emeritus and Consultant. Specialized in educational applications of advanced information/telecommunications technologies. International Guest Lecturer for faculties of education and schools of library and information science. Visiting Scientist, U. of Michigan, 1974-5; Guest of British Council, 1974; Guest of West German Research Council, 1975. Author of Extended List of References, Mediagraphy, and Notes Regarding the "World Brain" and Closely Related Concepts (a bibliography), and numerous other publications. Co-founder (with Manfred Kochen) of World Mind Group of international information scientists dedicated to implementing the ideas of Comenius and H. G. Wells regarding World Encyclopedia and World Brain.

MANFRED KOCHEN (B.S., MIT; M.S.and Ph.D., Columbia U.) Professor of Computer and Information Systems, U. of Michigan. Former manager of technical staff, IBM Research Center. Visiting research associate, Harvard U., 1973-4; visiting professor, Rockefeller U., 1980-81; consultant for Rand Corp., RCA, United Aircraft Co., and Library of Congress. Author of eight books including Some Problems in Information Science (1965); The Growth of Knowledge: Readings on Organization and Retrieval of Information (1967), which contains Watson Davis' "The Universal Brain: Is Centralized Storage and Retrieval of All Knowledge Possible, Feasible, or Desirable?"; Integrative Mechanisms in Literature Growth (1973); Principles of Information Retrieval (1974); Information for Action: From Knowledge to Wisdom (1975), which contains Eugene Garfield's "The World Brain as Seen by an Information Entrepreneur" and Derek de Solla Price's "Some Aspects of 'World Brain' Notions"; Information for the Community (1976); Decentralization: Sketches Toward a Rational Theory (1980); "Information and Society: Six Paradoxes" in Annual Review of Information Science and Technology, Volume 18, 1983; and numerous journal articles, including "WISE: a World Information Synthesis and Encyclopedia," Progress in Documentation, December 1972. Ford Foundation Fellow, Fellow AAAS; ASIS Award of Merit, 1974.

GLYNN HARMON (M.A., U. of California, Berkeley; M.S. and Ph.D., Case Western Reserve U.) Associate Professor of Library and Information Science, U. of Texas, Austin. Served in U. S. Navy, 1955-59, 1962-64; received China Service Medal. Visiting lecturer, U. of Michigan, summer 1968. Author of The Legislative Audit of State Finance in California (1963); Assessing the Relevance of Information in the Research Process (1965); Human Memory as a Factor in the Formation of Disciplinary Systems (1969); and Human Memory and Knowledge: A Systems Approach (1973); and contributor to Research Designs in General Semantics (1969); Copying with Increasing Complexity (1971); and Toward a Theory of Librarianship: Papers in Honor of Jesse Hauk Shera (1973)--his chapter is "The World Encyclopedia Concept." Member of American Association of Library Schools, ASIS, World Future Society, Beta Phi Mu. He holds a commercial pilot's license.

PARKER ROSSMAN (Yale: Ph.D. in Education and former Dean of the Ecumenical Continuing Education Center) Author of many books, including Computers: Bridges to the Future (Judson Press, 1985), which includes sections on the potential impact of forthcoming fifth-generation computer intellectual tools on research, the shape of thought, and global action for peace and justice. That book led to his involvement with Japanese scientist Takeshi Utsumi and to becoming Consultant on Global Education for GLOSAS (the Global Systems Analysis annd Simulation) Project and its 1986 and 1987 demonstrations (computer conferencing and slow-scan TV). He is, therefore, currently writing books about the use of such global scale tools in playing peace games on the scale of Pentagon war games; and about such connections of universities on several continents for peace gaming, exchange of research, exchange of courses, and experiments towards the emerging global electronic university consortium. He sees that consortium as the instrumentality which is creating the emerging "world brain." He is the author of "The Coming Great Electronic Encyclopedia" in Global Solutions (World Future Society, 1984; Edward Cornish, Ed.). He is currently co-authoring a book on the emerging digital age with five co-authors on the Networking and World Information (NWI) computer network.

GEORGE VLADUTZ graduated as a chemical engineer and received doctorates in chemistry and information science in Moscow (USSR). From 1956 to 1974 he was a leading researcher at the Institute for Sci-Tech Information (VINITI) of the Soviet Academy of Sciences, active in the field of chemical information systems, information retrieval, and foundations of information science. After a year as British Library Visiting Research Fellow at the University of Sheffield (UK), he joined the Institute for Scientific Information in 1956 as ISI's manager of basic research, working in automatic indexing, information retrieval, and scientometrics.

Biographical Data
EUGENE GARFIELD, Ph.D.
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Dr. Garfield is the founder of the Institute for Scientific Information. ISI produces a broad spectrum of publications, services, and systems designed to monitor and condense the flood of published scientific and technical information. Over 600 people are employed at ISI, which is widely recognized as a pioneer in the information-systems field in the United States and abroad.

Prior to founding ISI, Dr. Garfield held various positions as a chemist and an information scientist. In 1951, he joined Johns Hopkins University's Welch Project for evaluating methods of automated indexing, where he developed the concepts that were to form the basis for ISI products. In 1956, he founded an information engineering consulting firm called Eugene Garfield Associates. In 1960 its name was changed to the Institute for Scientific Information. ISI remains a private, non-governmental organization.

Dr. Garfield's education includes a B.S. (1949) in Chemistry and an M.S. (1954) in Library Science from Columbia University where he was the first Grolier Society Fellow (1953-54). He later received a Ph.D. (1961) in Structural Linguistics from the University of Pennsylvania. His doctoral dissertation applied modern linguistics to the problem of automatic indexing of chemical information.

A member of the American Society for Information Science since it was founded, Dr. Garfield won the ASIS Award of Merit in 1975. He is also a Fellow of the Institute of Information Scientists of London.

He is a 30-year member of the American Chemical Society. He received the Herman Skolnik Award from the Division of Chemical Information Science in 1977 and the Patterson-Crane Award for chemical information in 1983. Dr. Garfield is also a member of the Chemical Notation Association and received the CNA Award in 1980.

Dr. Garfield helped establish the Information Industry Association (IIA) in 1968 and has served as President and Chairman of its Board of Directors. In 1977, he received the IIA's Hall of Fame Award.

In 1984, he became the first information scientist to receive the John Price Wetherill Medal, awarded by The Franklin Institute in Philadelphia. In 1984 he also received the first Derek Price Memorial Medal in scientometrics.

Dr. Garfield is also a member of the Institute of Electrical and Electronic Engineers, Medical Library Association, Special Libraries Association, and Association for Computing Machinery. He is a member of the Authors League of America, the National Association of Science Writers, and the Society for Scholarly Publishing. He is an elected Fellow of the American Association for the Advancement of Science and has served as Chairman of Section T (Information, Computing, and Communication).

In 1978, he became a member of the Rockefeller University Council. Dr. Garfield is also a member of the Board of Directors of Annual Reviews. He serves on the editorial boards of Scientometrics and the Journal of Information Science. He also serves on the advisory committee for the John Scott Award for useful inventions, presented annually by the City of Philadelphia.

Dr. Garfield has served on several committees of the National Academy of Sciences including those on Cardiovascular Literature, Oceanographic Documentation, and Scientific and Technical Communications (SATCOM). He also participated in the White House Conference on International Cooperation and has testified before several committees of Congress on matters relating to information and copyright policies of the United States Government. He was a member of the National Commission on Libraries and Information Science Task Force on a National Periodicals System.

Dr. Garfield is the author of numerous papers on information science. He has lectured widely in the United States and throughtout the world. He delivered the 1983 Ranganathan Memorial Lecture, sponsored by the Sarada Ranganathan Endownment for Library Science in Bangalore, India. In 1984 he spoke to the Science, Technology, and Society Colloquium and also to the Three Cultures Dialog at The Pennsylvania State University. In 1985, he delivered the Alza lecture of the Biomedical Engineering Society and the Miles Conrad Memorial lecture of the National Federation of Abstracting and Indexing Services and was a guest lecturer at the Jackson Laboratory, Johns Hopkins University, and the Canadian Association for Information Science.

At the University of Pennsylvania, he is Adjunct Professor in the Department of Computer and Information Science. He holds U.S. and foreign patents on devices for selective copying and reproduction of information.

For the past several years he has written a weekly column called *Current Comments*®. Over 900 of these essays and other works are now collected in nine volumes of *Essays of An Information Scientist*, which won the American Society for Information Science award for best information science book of 1977. His book *Citation Indexing-Its Theory and Application to Science, Technology and Humanities* was published in 1979 by Wiley and reprinted in 1983 by ISI Press.

Dr. Garfield also writes a column in ISI's new bi-weekly newspaper for the science professional, *The Scientist*.

ISI is a private, non-governmental corporation that provides its computer-based information services throughout the world. These services are used by research personnel, librarians, educators, managers, and others to locate and obtain relevant information published worldwide in scholary, scientific, and technical journals and books.

Nearly half a million individuals rely on one or more of ISI's many information services each week. Users are found in a wide range of academic, governmental, and commercial organizations throughout the world and represent every discipline of science and technology, the social and behavioral sciences, and the arts and humanities.

ISI information services are variously available in print, microfilm, online,and magnetic-tape format. The best-known services are Current Contents,Science Citation Index, The Scientist, Automatic Subject Citation Alert(ASCA), Arts & Humanities Citation Index, The Genuine Article, SCISEARCH and Sci-Mate software for microcomputers.

The R^{III} Concept

by H. J. Abraham Goodman

In general, the general notion or concept encompasses not only the products of the particular institution described below but also the institution itself and the processes involved in its establishment and operation. The institution in question is ultimately to be endowed with the full geographic scope, with virtually all of the characteristics and structural components, as well as with the capability of performing competently the various functions and services set forth below.

Geographic Scope

Eventually the institution, its services, and its products are to be international, world-wide, and even universal, in virtually every conceivable respect. They are to be freely accessible to everyone, everywhere (i.e., with minimal censorship and on a nominal charge for use, public expense basis). They are to be created by every individual or group available for and capable of contributing to their creation: they are to be owned by and to be accountable to everyone who can benefit from their existence and use, everyone who assists in paying the cost, in time or money, of bringing them into existence, distributing them, and maintaining them. And they are to be operated or maintained, as the case may be, by those who are most competent and willing to do so, regardless of their race, color, creed, sex, age, place of origin, nationality, citizenship, or place of residence.

Subject Matter/Content Scope and Characteristics

The institution, its services, and its products are to have within their purview, as areas of explication, as fields of study, research activity, and criticism, all wisdom, all knowledge, in all subject-matter fields (all sciences, all the arts, and all the humanities), all the content of communication, all education, all training, all information, all data -- the entire past, present and future intellectual heritage of mankind. They are to be omniscient in the sense of their possession of the capability of producing, organizing, synthesizing, analyzing, storing, transmitting, and presenting information and knowledge, etc., about any or all of the foregoing subject areas. They are to do so without their necessarily being involved in the direction, ownership, or functioning of the various institutions and/or industries which normally exist and function within and beyond these subject areas.

Professions, Vocations, and Avocations Characteristic of the Clientele to be Served

The institution, its services and its products are to be brought into existence and to be operated for the express purpose of serving the needs of their users as individuals and/or as members of groups, as well as serving the needs of mankind as a whole. In addition to serving individuals and groups as citizens and as taxpayers, it will serve their needs as "producers" and/or "consumers" as well as organizers and disseminators of data, information, knowledge, wisdom, education, and training in all fields of human endeavour and interest. As it is the "end users" whose information/learning need fulfillments are to constitute the primary purpose of the institution and all its "works," it will be largely in their individual and collective capacities as citizens, learners, students, or pupils; as academics, scholars, or educators; or as intellectuals or researchers, that the institution will seek to serve their aforementioned needs.

Functional Characteristics of the Institution, Its Services, and Its Products

They are to be dynamic and ever-changing, both in order to ensure their survival and to best serve their clientele. They will accordingly be undergoing constant revision and continuous updating. They will be both eclectic and cumulative in their functioning and/or characteristics. They will result from collaborative and/or cooperative efforts as the interrelated component parts of an integrated, articulated, unified, synthesized, and systematized living organism. And to ensure their most efficacious functioning and use in serving the informational/educational needs of their individual users in an automated yet "custom-tailored" fashion, they will, if need be, be multi-lingual, multi-dimensional, multi-sensory, and available to all in a full range of mediated formats or channels.

Functioning together, the institution, its services and products will, with their ganglia and nodes, constitute more than a world-wide information-communication-educational network. They would comprise more than a mere international wisdom and knowledge exchange depot or clearing house. They would comprise more than the aggregation, more than the totality of the research data, the hypotheses and the generalizations collectively emanating from all the world's institutes and academies of a national or international nature. And, although they would contain, in repository, repertory, or data bank form, mankind's entire intellectual heritage, they would, in their systematic organization, or their synthesized format, be nothing less than humanity's single mind, its encyclopedic-thesaurus-memory and brain, however numerously it might be duplicated and distributed throughout the surface of the earth.

"There is needed in this century an immediate remedy for the frenzy which has seized many men and is driving them in their madness to their mutual destruction. For we witness throughout the world disastrous and destructive flames of discords and wars devastating kingdoms and people with such persistence that all men seem to have conspired for their mutual ruin which will end only with the destruction of themselves and the universe. Nothing is, therefore, more necessary for the stability of the world, if it is not to perish completely, than some universal rededication of minds. Universal harmony and peace must be secured for the whole human race. By peace and harmony, however, I mean not the external peace between rulers and peoples among themselves, but an internal peace of minds inspired by a system of ideas and feelings. If this could be achieved, the human race has a possession of great promise."

John Amos Comenius (Komensky)
Pansophiae Diatiposis (Patterns of Universal Knowledge), 1643

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"In a universal organization and clarification of knowledge and ideas, in a closer synthesis of university and educational activities, in the evocation, that is, of what I have here called a World Brain, operating by an enhanced educational system through the whole body of mankind, a World Brain which will replace our multitude of unco-ordinated ganglia, our powerless miscellany of universities, research institutions, literatures with a purpose, national educational systems and the like; in that and in that alone, it is maintained, is there any clear hope of a really Competent Receiver for world affairs, any hope of an adequate directive control of the present destructive drift of world affairs. We do not want dictators, we do not want oligarchic parties or class rule, we want a widespread world intelligence conscious of itself. To work out a way to that world brain organization is therefore our primary need in this age of imperative construction.

"It is an immense undertaking but not an impossible undertaking. I do not think there is any insurmountable obstacle in the way to the production of such a ruling World Brain. There are favourable conditions for it, encouraging precedents and a plainly evident need."

Herbert George Wells
"Preface" World Brain, 1938

CHART OF THE PAST

1800-1850 Camera / Babbage calculator/ Telegraph
1850-1900 Telephone / Phonograph/ Office machines
1900-1910 Vacuum tube
1910-1920 Radio
1930-1940 TV
1940-1950 Radar / Tape recorders/ Electronic computers / Cybernetics
1950-1960 Transistor / Maser/ Laser
1960-1970 Communication satellite

CHART OF THE FUTURE

1970 Translating machines
1980 Personal radio
1990 Artificial intelligence
2000 Global library
2010 Telesensory devices
2020 Logical languages / Robots
2030 Contact with extra-terrestrials
2050 Memory playback
2060 Mechanical educator / Coding of artifacts
2080 Machine intelligence exceeds man's
2090 World Brain

ARTHUR C. CLARKE /
Profiles of the future, 1967

WISE: A WORLD INFORMATION SYNTHESIS AND ENCYCLOPAEDIA

by Manfred Kochen
University of Michigan

(Progress in Documentation, December 1972)

ABSTRACT

The Introduction describes H. G. Wells' proposal for a "World Encyclopedia" in a lecture to the Royal Institution of Great Britain on November 20th, 1936, which was printed in an obscure book titled World Brain. Wells had called for a "new social organ to bring together the 'scattered and ineffective mental wealth into effective reaction upon our everyday political, social, and economic life,'" and the author observes that "world mental health through world mental wealth is perhaps a more urgent and more appropriate slogan today" than it was in 1936 . . . "far too important an idea to be left dormant, undiscussed, unexplored."

A Brief History of an Idea traces the concept of "a new social organ that organizes world-wide wisdom to help solve immportant problems" from the Bible, Plato, and Aristotle through Bacon, Liebnitz, and the great encyclopaedists Diderot and d'Alenbert, and Hutchins and Adler, to work at the University of Chicago on "Encyclopedia and Unified Science" by O. Neurath, a contemporary of Wells apparently unknown to him. The trail continues with Vannevar Bush in 1945, the computer and information technologies of the 1950's (including automation of the Library of Congress), A. Weinberg's 1963 report of the President's Science Advisory Council, the COSATI Reports of the later 1960's, the UNISIST (UNESCO's feasibility study on a world science information system) and OECD (Information for a changing society) reports of 1971, and the 1969 publication by Knight and Nourse, Libraries at Large.

Dr. Kochen cites the efforts of Watson Davis to promote the Wells idea of a "universal brain" in his paper delivered before the National Microfilm Association on May 13, 1965. Other sharers of the Wells vision include Buckminster Fuller, H. Boyko, A. deGrazio, Glynn Harmon, D. Soergel, and H. Schwartzlander, J. Stulman's World Institute, and other developmental efforts to build "information-network indexes on world problems."

The balance of the paper is an analysis of WISE, described as a "way of looking at the problems of improving the coupling between our mental wealth and our ability to shape our lives to make them more to our liking," intended to answer the question, "How can a decision-maker utilize existing wisdom for more effective real-world problem-solving"? Much of the analysis compares WISE with UNISIST. For example, UNISIST's long-range goal is to "develop international networks of information services in the

various sectors of science," while that of WISE is "to create a new social organ, a 'community brain.'" After restating his earlier information/knowledge/understanding/wisdom paradigm, the author lists the key problems which need to be confronted at the outset. As functional characteristics, he describes a WISE as needing to be selective, dynamic, interactive, hierarchical, and sensitive. He visualizes the eventual object of the concept to "resemble an institution like a consortium of universities and research centres, perhaps a fourth branch of government in parallel with its executive, legislative,and judiciary branches," probably requiring "a novel concept for its organizational existence in international law." A list of intermediate objectives are compared with those of UNISIST.

Before concluding with a challenging list of recommendations for all of us (educators, political leaders, decision-makers, artists and novelists, funding agencies, university students, researchers in law, information specialists, scientists and researchers, publishers, and manufacturers and distributors involved in the technologies of information and communications), Dr. Kochen defines WISE as:

"1. A paradigm for the new 'information sciences', a set of ideas which provide a way of looking at problems, of ranking them in priority.

2. A movement which not ony responds to socio-political forces but which provides creative, innovative, and wise leadership toward the creation of new social organs which are to communities what brains are to individuals.

3. A growing, learning system for effectively coupling cumulated knowledge, understanding, and wisdom with the key social and political problems faced by decision-makers from day to day."

Prepared by June Andel for distribution at SIG Session, "MIDWIFING THE WORLD BRAIN: 50th Anniversary of Publication of the H. G. Wells Classic", Annual Meeting of the American Society for Information Science, Boston, October 6, 1987.

ASIS-1987
SIG/AH

WORLD BRAIN: THE POWER VERSUS GENERALITY ISSUE IN ARTIFICIAL INTELLIGENCE

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Abstract. H.G. Wells envisioned the World Brain (Encyclopedia) as a comprehensive and coherent synthesis of all human knowledge for the testing of facts and statements and the clearing of misunderstandings. The World Brain was to achieve the highest level of generality, and yet be effective in addressing particularized problems. This dual capability may not be fully attainable in the monolithic sort of system that Wells envisioned. In artificial intelligence, it has been demonstrated that the scope of a system's domain knowledge tends to be inversely proportional to its power to deal rigorously with specific problems. This trade-off has been represented as the "power versus generality" issue.

Attempts to build the General Problem Solver at Carnegie Mellon University, somewhat along the lines that Wells described, illustrated the enormous difficulties inherent in a broad, general approach. In contrast, subsequent efforts resulted in the development of expert systems that were restricted to very narrow domains of knowledge and provided the power (beyond critical thresholds) to solve specific problems effectively. The developmental lessons learned from both the General Problem Solver effort and the expert systems movement can be applied to the World Brain initiative.

To illustrate, the perennial problems of war could be addressed via a World Brain's general knowledge base about the phenomena of international conflict and cooperation. But this generalized knowledge base might lack the specificity to deal rigorously with the critical forces of war. In contrast, an array of expert systems could suggest heuristics for dealing, for example, with cycles of war. Various kinds of international wars appear to be predictable in that they repeat about every 10, 22, 57, or 142 years. Expert systems geared to the cyclical nature of war could provide timely and robust heuristics for leaders to prevent or deescalate international conflicts. The World Brain, then could be developed not so much as a monolithic system but as an array of modular, dedicated components consisting of highly evolved artificial intelligence and network technologies.

THE "WORLD BRAIN" TODAY: THE SCIENTOGRAPHIC APPROACH TO KNOWLEDGE REPRESENTATION

by George Vladutz
Institute for Scientific Information
July 31, 1985

ABSTRACT

It is observed that current trends in knowledge engineering, represented by highly specialized expert systems, do not alleviate the problems of information exchange in the scientific research community resulting from increased specialization and decreased interaction between disciplines. To counteract these trends, the author explores the applications of computerized knowledge management technologies to the broadest possible domains of scientific knowledge, approaching the global scale.

Instead of pursuing "logical depth" with which AI knowledge representation techniques compensate for the limited width of their domains, the author suggests a broad-scope approach, characterized by the coined-by-him term "scientography", stressing emphasis on exploring the "geography of science." Indicating a close relationship to "scientometrics" and efforts at "mapping of science", the scientographic aproach attempts to collect generalized, macroscale knowledge with maximum computer assistance and minimum human intervention as a first step, to be followed by more micro-oriented manipulation appropriate for human problem solving.

This convergence of micro- and macro-oriented approaches to computerized knowledge management with the shared goal of achieving new problem-solving capabilities in broad fields of scientific R&D activities is related to the "World Brain" concept of H. G. Wells as elaborated by Eugene Garfield, as well as to Manfred Kochen's concept of the World Information Synthesis and Encyclopedia (WISE) and its latest derivative, EUREKA-1.

In a discussion of basic approaches to the problem of knowledge representation (KR), the author proposes as a scientographic KR tool a semantic network based on a "concept dependency" relationship. Such semantic networks of mid-way strength could be constructed for large domains of knowledge with clearly defined connections with significantly stronger formalized representations through the application of predicate-calculus(PRC)-based methods. Using first-order PRC, the idea of concept dependency networks is illustrated by constructing a network of some basic concepts from the domain of "citation analysis."

The successful efforts to represent the structure of scientific fields, mainly on the basis of citation data are reviewed. The prospects for developing related methods for the computerized construction of more-or-less global KR networks ("concept maps") based on relatively weak concept dependency relationships and the possibility of using citation networks and other similar tools for this purpose are discussed.

Section 8 (pp. 215-299) of Data Base Management: Proceedings of a Conference, November 1-2, 1984; Department of Statistics, Stanford University, Stanford, CA. Prepared under contract N00014-76-C-0475 (NR-042-267) for the Office of Naval Research; Herbert Solomon, Project Director.

(Abstact prepared by June Andel for distribution at SIG Session "MIDWIFING THE WORLD BRAIN: 50th Anniversary of Publication of the H. G. Wells Classic", Annual Meeting of the American Society for Information Science, Boston, October 6, 1987.)