

REPORT OF WORKING GROUP ON SCIENTIFIC KNOWLEDGE,
EDUCATION, AND COMMUNICATION

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1. We are committed to the creation of a world order of human dignity in which social and political institutions exist and operate to ensure conditions for the optimal self-realization of every member of the world community.

2. Our demand for human dignity is posited on a conception of the human being as an integrated biological, environmental, social, and psychic creature, appropriately equipped to make and influence the entire spectrum of personal and group decisions of the various communities in which he lives.

3. The systematic search for and organization and utilization of knowledge will play an important role in the realization of human dignity. It is indicative of the deep fractionation of thinking about man in the environment that no single word is readily available to designate inclusively the foci of the natural sciences, the social sciences, the humanities, and the arts. We will use the word *knowledge* to refer to all these cognitive activities that bear on making decisions about man in nature.

Knowledge, so understood, does not make decisions but is a requisite component of efficient, economic, and rational decision making. Where practices abusive to man and his environment have been perpetrated under the guise of science, it is retrospectively clear that the knowledge purportedly applied was quite imperfect, often because of the restrictive focus of a single "discipline." A number of points are patent. Along with errors and damage to the physical and political environment, many radical improvements to these same environments have also been made. As for the serious damage that has been done, a markedly improved flow of knowledge will be necessary for rectification. Hence, the movement toward and ultimately the maintenance of a world order of human dignity is not conceivable without a plenary flow of accurate knowledge to all those concerned with making and appraising decisions—at some point in the future, all mankind.

4. In view of the integrality of natural phenomena and natural and social phenomena and the necessarily global scope of human efforts to harness or accommodate to them, we urge the establishment of a global network of institutional arrangements for the purpose of making knowledge, understood most broadly, about all aspects of social process, available in a comprehensive, timely, and efficient manner to those who make, and to those influenced by, the decisions of mankind. All existing institutions should be considered as resources for this task; new institutions will be created and maintained only as they serve the needs of the world community. Institutions, it must be remembered, are not ends in themselves, but only instruments for the realization of shared goals.

Knowledge goals for global planning and decision may be most economically explored in terms of a world knowledge process, composed of focusing on problems, gathering and processing information, and disseminating knowledge to all concerned. There must also be feedback to the knowledge process itself, for an ongoing appraisal of the correspondence of practice to goal. The working

group has considered and organized its recommendations for each of these successive sequences.

Focus

The sustaining focus for the global process of knowledge is the human being, growing in those conditions that stimulate and facilitate the realization of his manifold potentialities and simultaneously take full account of his biological, environmental, psychic, and social character. An informed focus on mankind includes, at a minimum, comprehensiveness, contextuality, and future orientation. Because physical and cultural realities are not a series to discrete events but are integral, interstimulating components of a whole, meaningful observations and beneficial manipulations can be made only with a disciplined and sustained comprehensive focus. What we need, as one scholar has felicitously put it, is a "macroscope," a focusing instrument that will discard trivia and create purposive attention commensurate with the range of interacting data. Contextuality places a particular event in its full context in order to derive its significance. Single technical solutions, whether they are initially physical or social, must be placed in context so that they do not cause new and greater problems. Future-orientation, an aspect of contextuality, extends the interrelation of events through time, obligating decision makers of today to consider the impacts of alternative choices on future generations in future environments. An appropriate focus implies a responsibility to inspect new social institutions in all their probable effects and to consider the diffusion and social effects of new inventions.

Problem-orientation is also an aspect of focus. We refer to the assembly of knowledge tools to deal with the problems generated by demands for the conditions of human dignity. Some scholarship in the past has included a reflexive, artificial reality in which problems were assembled to fit the limited tools that an investigator happened to have. Real problems are shared; their solutions require pooling resources and sharing data.

Gathering and Processing

The acquisition of data about man and his environment and its processing, storage, retrieval, interpretation, and adaptation will necessitate a worldwide network, integrating existing and newly created institutions, adapting available technology and introducing new techniques for more ambitious and increasingly novel knowledge goals. Although improved communications may permit centralized data banks, processing phases should be widely dispersed to optimize data collection and to share the educational potential of these functions in all sectors of the globe. Within an integrated global knowledge system, we recommend that local and regional units gather and process data of inclusive interest and, at the same time, serve as feedback points for the utilization of information at the local level. Given the fluidity of basic research and applied technology in this area, we refrain from more specific recommendations, which often tend to "freeze" the art and offer, instead, this overall set of policy preferences.

The emphasis on policy and function rather than specific techniques gives perspectives in several features of the gathering and processing sequences.

There has been a tendency to confuse artifact and function. The important function, of course, is the efficient processing, storage, and delivery of information to human beings. For several thousand years, civilizations—as opposed to ancient and contemporary folk cultures—have used script as the primary modality for these sequences, with the primary sensory channel linear and visual. These processing techniques have had a diffused and remarkably deep effect on perception in general. Electronic technology has opened up a variety of other modalities, with an entirely new range of influences on perception. In the future, the full range of modalities and channels should be inventoried, the full range of their contextual effects systematically investigated, and choices of method at particular times should turn on the needs of knowledge consumers, their abilities, the exigencies of the context, and the probable impacts on future behavior.

Many of the problems and possibilities of languages entail both processing and disseminating. Problems of changes and trends in language dominance are particularly topical. The development of new communicational systems tooled to the processing and dissemination of specific types of knowledge should be explored and set in the context of available and potential information systems. There is a full range of communicating techniques using other signs and symbols than words. The exploration of this area may provide a set of rapid and economic ways to increase the processing and dissemination of knowledge.

Dissemination

Knowledge is of scant utility to mankind if it is not delivered to those charged with making and appraising decisions in a timely, economic, and accurate manner. We identify four major dimensions to the global dissemination of knowledge: communication among scientists, communication with political leaders, education, and media communication. These important areas must be considered separately.

1. The integral aspect of natural and social phenomena and the unfortunate fractionation of individual disciplines require constant and intense interchange between knowledge specialists, within and across disciplines. Verbal declarations of the interdisciplinary faith and sporadic and comparatively primitive multidisciplinary conferences are a far cry from the needs of a global community. Entirely new techniques must be explored. Electronic communication portends a new range of channels, and they must be explored and expanded. The potential of the telephone, and conference call, the telelecture, closed TV, teletyping, flying seminars, as well as other adaptations of technology, must be explored.

The techniques of interpersonal communication cannot, of themselves, surmount internal psychological and emotional obstacles, nor can they be absorbed and usefully integrated without a frame of reference sufficiently comprehensive to indicate the relevance of the research of others. We note with sadness the ludicrous "sovereignization" of fragmented and refracted disciplines and the petty arrogance of individual scholars regarding the utility of the intelligence products of other disciplines. The word *discipline* in this connotation is unfortunate, for it affirms by denial the separateness of dis-

ciplines, including the capacity to generalize. Let the point be utterly clear. Anyone with any understanding of the process of enlightenment and any commitment to the life of the mind automatically confesses his permanent inability to know everything about everything, and, indeed, even to know everything about a small subject. The intellectual life is, in the deepest sense, a community experience; a constant sense of one's own incompleteness and dependence on others with special knowledge of other areas of a varied, manifold, but integral reality.

2. Because a complex society charges certain individuals with major public responsibilities and functions, these decision makers will have exceptional requirements for knowledge, and an understanding, in the most comprehensive sense, of the process of change. In the past, without being so equipped, political leaders have even defined the goals of knowledge specialists and used the knowledge acquired for their own special interests. We believe that knowledge must be used for all mankind, but we recognize the unique demands of specialized political communication. A number of points are clear. First, that political systems are inextricably intertwined with the knowledge process and that a commitment to a global system of human dignity carries with it a commitment to political structures posited on, working toward, and incorporating principles of human dignity.

Whatever the specific structures such systems may take, the special educational needs of decision makers should be emphasized. Decision makers must be equipped with a broad frame of reference that permits them to identify problems and to trace through time the aggregate consequences on man and his environment of the alternate courses of action open to him. We would also recommend the development of education for policy making and for decision making and, in particular, techniques for processing, storing, retrieving, interpreting, and applying the decision experience of individuals; this is a resource that, it seems, is not systematically exploited. In the future, planning goals for increasingly available conditions of human dignity may require more knowledge, and this may become an institutionalized component of global decision making. We note, in this context, Warren S. McCulloch's principle of the redundancy of potential command when information constitutes authority.

3. Every phase of the global knowledge process comprehends learning and relearning. But the sequences of dissemination turn on education in a special sense. First, it is clear that the availability of knowledge assures neither that it can and will be used nor that, if used, it will be used well. Appreciation of the relevance of science to decisions about man and society and the environment and the ability to use that knowledge implies a breadth and depth of education that go far beyond our current goals. Hence, unless the general member of the world community of the future is equipped with a sufficient education, the availability of knowledge will be of no personal use to him, nor, in particular, will he be able to share in the power processes of the various communities in which he lives. Second, a focus on mankind implies a concern with the optimal development of the manifold talents of man, so that he can serve himself, so that he can change or accommodate himself to his plenary environment.

One of the first priorities is more learning about learning. We recommend that man's learning be consciously extended beyond the limits of institutions, through all his life. We emphasize as well that it must be extended forward to birth and even to the fetal state. Because of institutional myths and adminis-

trative conveniences, the fantastic learning capacities of the preprimary years have been squandered. We urge that they be utilized.

Education does not mean the colonization of data bits in the neurons of unwilling subjects. It aims at the development of a creative attitude toward knowledge and experience—not a mere accumulation of fact. It means, in short, equipping individuals with the capacity to learn. Education must be premised on the whole man and woman, engaging not only his cognitive activities, but all others—political, affective, playful, and so on. It must include the development of a multitalented human being, optimally equipped for a range of activities—planning, creating, forecasting, decision making, communicating, and many others. The process of education should develop free inquiry and the concomitant self-confidence in imagination and institution that this implies. It should foster plurality and divergence, a capacity for play with ideas, and hospitality toward those of others. It should encourage both associative and analogical thinking. The enormous potentials for inventiveness within a limited framework, as well as the refashioning of ever broader frameworks, must be conveyed.

Particular emphasis must be directed to the teacher, a term that, in its full contemporary connotation, may be a misnomer. Teaching entails reciprocal learning, not one-way communication. In our world of high-velocity change, the teacher who has ceased to learn has ceased to teach. In particular, the problem of the generation gap should be perceived as a reciprocal educational problem. Generations separated by a tremendous experience gap and peoples of extraordinary diversity of previous and future cultural experience will be in continuous contact. This can be either mutually destructive or mutually reinforcing. Teaching and learning can no longer be a linear process from those who know to those who do not know yet, as it has been in the past, but a process by which those who have one form of experience or one current form of knowledge or expertise, wisdom, or inspiration are in mutual communication with each other. In such a system, the teacher of a three-year-old will have to learn first about the experience of that three-year-old, new and unknown to that teacher, because no one will ever have been a three-year-old in just that cultural and situational state. Similarly, the experience of the old, now carelessly disregarded, will be cherished and placed in context as equally precious because, just as the experience of the young today has never existed before, so the experience of each older group will never exist in that form again. The extent to which the experience of each age group differs in a rapidly changing society will have to be recognized in a new design for educational institutions to which individuals will periodically return, or in which they will periodically participate as both learners and teachers. The knowledge and habits of living needed by men and women and children in our changing society will need continuous responsible reviewing, renewing, and innovation.

New environmental needs will require a new technology of learning a new conception of the congruence of learning and living and a full appreciation of the regional and local variations of knowledge diffusion in a multilingual world. We commend to scholars the urgent consideration of these challenges.

4. The media represent a major opportunity for the dissemination of knowledge about decisions affecting man and his environment to the widest audience. We view them as a resource and urge that they be viewed functionally as a public utility of the world community aimed at realizing the most inclusive

interests. We urge that the media be exploited to the fullest as a modality for enhancing the conditions of learning for all mankind. Where the media permit a vaulting over intermediate stages, this should be done. There is no inexorable progression in the adaptation of knowledge for an improvement of life.

Accordingly, we recommend to the plenary conference:

1. Within the framework of WAAS the establishment of an effective world-wide institution to monitor the flow of knowledge relevant to man and his environment in transition. This institution would provisionally be called the Global Knowledge Center. Its membership policy would seek to transcend the transient political divisions of political leaders. It would perform among others the following functions:

—establish goals and priorities for the processing of knowledge relevant to global decisions.

—establish contact with existing international regional and national centers of knowledge, creating thereby a functional grid for the collection, processing, and dissemination of knowledge. To this end, GKC might seek consultative status with appropriate international intergovernmental agencies,

—encourage the establishment of new knowledge centers that it deems necessary,

—recommend the allocation of funds for the establishment and maintenance of such centers as are deemed appropriate to the most inclusive community goals,

—publish timely reports of the world knowledge system as well as substantive levels of knowledge in all areas relevant to decisions of global impact,

—foster an ongoing study of the world knowledge process within the framework of the World Academy and regional and national universities and, in particular, encourage innovations in gathering, processing, and disseminating knowledge.

2. That an interim committee be formed and be charged with the drafting of plans and a statute for GKC and that the Committee return its report and recommendations at the next conference.

3. That a number of crucial problems, some of immediate and some of prospective importance, be initially studied by WAAS or under its auspices and that these same studies, relevant to the global knowledge process, be thereafter transferred to GKC or one of its associated institutions. Among these problems and projects are:

—the monitoring and correlation of different developments in a number of countries in order to speed up the entire process of the advancement of knowledge and to avoid the waste of valuable funds for work that has already been done,

—studies of cognitive processes that might facilitate learning.

—the optimal integration of hardware and software,

—the complex of matters relating to population control; the development of contextual and conceptual demographic models,

—new techniques for the storage and delivery of different types of data and knowledge.

4. That governments and international organizations increase significantly the funds for research about the global knowledge process and about specific areas of substantive knowledge. In particular, we recommend that the distinction between basic and applied research be suspended, because the two interlock and are equally important. The content of the terms is often parochial: what is basic and what applied shifts with perspective, with time, and with the problems encountered.