PLANNING FOR THE 1960's IN THE 1970's : PART IV

*A continuation of the review of some of the implications of the SATCOM report on the United Nations in terms of the total network of organizations making up the world system and the complex network of interacting problem areas.**

by Anthony J.N. Judge

The Committee on Scientific and Technical Communication (SATCOM) was established in February I966 by the National Academy of Sciences and the National Academy of Engineering to investigate the present status and future requirements of the scientific and engineering communication with respect to the flow and transfer of information, principally in the U.S.A. The work of the Committee is closely related to that of the Joint UNESCO-ICSU Committee for a Worldwide Science Information Service. This Report is important because of the manner in which its basic principles contrast with those of the UN Reports. The SATCOM Report is permeated by an awareness of the interdependence and variety of different types of autonomous organizations with their own interests and different but related needs and the importance of shared responsibility.

RECOMMENDATION B6

Each larger scientific or technical society or association should assist and encourage its natural subdisciplinary groups to organize for and initiate the conduct of appropriate need-group services.

Leadership in obtaining specialized services and in the management of repackaging, updating, and annotating current bibliographic files and their associated literature very frequently will have to rest with subdisciplinary groups. In engineering, for example, estimates suggest 200 such groups, with varying degrees of overlap, whose efforts, if mobilized toward these ends, could greatly enhance the development and provision of such services.

A salient point with regard to need-group services is that information must be transferred in usable form, which is not the same as simply disseminating documents. The information must be recast into the language of the professional community through such media as brochures, specifications, performance and characteristics compilations, standards, and handbooks. Often, it also must be conveyed personally if effective transfer is to take place. And here the traditions and institutions of the individual professions must determine the most suitable arrangements.

In medicine, there are several ways in which a highly motivated practitioner may get the information he needs to keep up with advances and to more distant future when still newer tools would provide even more effective services. Today we can : (a) sort out abstracts, especially if available in machine-readable form; (b) rearrange and merge selected abstracts; and (c) reproduce copies of the results in readable form, either on paper or in microform. The early information services for need groups will have to take such an approach for both technological and economic reasons. Consequently, immediate attention should be given to making abstracts and associated indexing information readily available for reprocessing, which, in turn, requires special attention to low cost and machine readability.

In the far future, so attractive yet so dotted with technological and economic question marks, this paper or film approach would be replaced by conversational, on-line access to computer-mediated files. The possibilities of on-going file modification alone are extremely attractive. As the motivation to seek out and use available information continues to increase, work habits and patterns of acquiring information will change and lead to still greater modifications and further advances.

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The immediate task in expanding the implementation of need-group information services is to stimulate the reprocessing of abstracts and associated indexing information prepared by the basic abstracting and indexing services. The most effective way to do so would be to restructure the support of abstracting services, providing sufficient funds from

INFORMATION ANALYSIS CENTERS

A potentially useful tool for the transfer of scientific and technical information exists in the information analysis centers. Such centers, usually serving specific fields in which large amounts of data exist and require critical evaluation, consist of one or more active specialists who (a) systematically collect, index, and store information in a field; (b) analyze and evaluate this information; and (c) make it available in a form and language keyed to the needs of specific groups of users. Over 100 such centers are sponsored by the federal government, usually in connection with mission-oriented programs; a number of others operate under private or local sponsorship.

MANAGEMENT CONSIDERATIONS

Certain problems of management arise in relation to all forms of scientific and technical communication — initial publication, basic abstracting and indexing, and need-group services. We discuss them in this section of the report because their importance increases as the services involved become more specialized and user-oriented.

RECOMMENDATION B15

All agencies which either operate or sponsor the operation of major scientific-and-technical-information programs should take steps to incorporate into their services on a continuous and systematic basis some appropriate method of performance evaluation. Provision should be made for using such evaluation measurements as a basis for modification and improvement of the services.

Most present information systems, particularly libraries, suffer from inadequate feedback mechanisms. Typically, they lack a sufficient degree of "statistical quality control". The usual measures of economic viability often are inapplicable because of the lack of any visible relationship between the cost of providing a service and the price paid by a user. In most cases, however, implementation of reasonable and practical measures of quality control, usually based on sampling the end product or services offered, need not await further research in order to provide useful results. Information services operated by for-profit organizations typically are highly sensitive to users needs and employ effective methods for marketing their products and services. Feedback controls and market sensitivities should be employed more widely by the not-for-profit information services.

In a number of disciplines, responsible staff members of information services operated by societies maintain a booth at the national meetings of these societies to discuss problems with users. Staff members also hold open forums to discuss or explain new services and solicit constructive criticism of their products and services. Most information services have advisory boards of expert consultants and also hire professional groups to make periodic user studies and surveys. Additionally, members of the operating staffs meet regularly to discuss methods for improving their information services. Many other methods are used, and should be; obtaining critical feedback and keeping services tuned to user needs is a continuous process, and its importance cannot be overemphasized.

Each formal link in the information-transfer process must function effectively and convery information-transfer process must function effectively and convey information to the next link to assure efficient communication; therefore, prospective users must be made aware of the existence of the component information products and services if the process is to operate smoothly and usefully. Fostering such awareness is the marketing function. No matter how good information is, the advantages of having created it are lost or greatly reduced unless this marketing function receives sufficient attention.

RECOMMENDATION B16

It should be recognized that one of the legitimate and vital aspects of the process of creating and disseminating information is marketing the output; therefore, organizations that are involved in developing and disseminating information products should use the most effective and appropriate marketing techniques available.

Basic policies for handling the dissemination of scientific and technical information, particularly in the relevant societies, usually are formulated by members of the scientific and technical community who, for

the most part, have rejected the view that information must be marketed. The general belief is that, if the information is valuable, the people for whom it is intended will find it. In fact, there is little basis for such a belief.

Two categories of information responsibility may well emerge — wholesaling and retailing. And these two functions may be handled by two different kinds of organizations, according to their capabilities. For example, scientific and technical societies and federal information services mights focus their efforts on wholesaling information, while subdisciplinary groups and, wherever appropriate, commercial organizations might handle the retailing function.

LIBRARY FUNCTIONS

The role of libraries, particularly research libraries and special libraries, is central in the process of communicating scientific and technical information. The great research libraries store and make accessible primary scientific and technical journals as well as secondary publications (abstracts and indexes that constitute the means of finding articles according to author, title, or subject), and even guides to these secondary services. They maintain bibliographic control, cusody, and a delivery system for enormous collections of monographs and journals and provide a rich variety of reference books and services. They act in many respects as nodes in a switching network that makes available information from other sources. Through many thousands of special libraries in various types of corporations and institutions, a multiplicity of highly specialized mission-oriented services are provided. Thoug the role that libraries play is crucial, the tradition of informal person-to-person communication as a way of keeping up with what is taking place in a scientific specialty is strong, and very often the services of libraries are bypassed through unwillingness to put up with slower and more cumbersome procedures or through ignorance of their availability.

As the backlog of knowledge accumulates, and scientific communication therefore becomes more and more complex, it is clear that many traditional practices will become increasingly unresponsive. Two main lines of attack on the problem are clearly indicated : First, library services should be improved, and second, scientists should become more familiar with the various types of information services that *are* provided.

The push-button library of the future — a vast store of machine-recorded data interrogated in a rapidly responsive on-line interactive system and supported by a great communication network — will eventually come about in some form or, in fact, in a variety of forms. It is not our purpose to prognosticate the detailed nature or the rate of development of such systems but to attempt to point out at least some of the crucial changes of an institutional, organizational, and philosophic nature that must be brought about in order to create the kind of environment within which technological innovation and the evolutionary improvement of libraries can flourish.

Simply to say that more money must be poured indiscriminately into libraries is not enough, for without the proper guidelines and a reasonable degree of over-all planning on a nationwide basis, the need for funds could become a bottomless pit. A deep reappraisal of the method of funding library services should be made. The possibilities of a closer tie between obtaining library services and paying for them should be carefully explored. Even assuming some base level of « free » library service, if users had the option of extra service for an extra price, the test of the marketplace might provide valuable guidance on the optimal allocation of library resources toward the most valuable services. Very often, however, user response to new, even good, services is characteristically slow; therefore, a greater effort must be mounted.

In view of this obligation of the scientific community, it is imperative that library services be made much more responsive. There are few limits to what can be done, given adequate resources. However, the burgeoning federal support of the scientific and technical research of the last two decades has not been matched with sufficient support of the library and information services that are necessary to ensure effective communication of the results of scientific research.

RECOMMENDATION C9

Scientific and technical organizations and other publishers must make a systematic effort to improve the quality and timeliness of formal publications. Lag times in publication of as much as a year must be considered intolerable. We believe that at present competently refereed publication is nearly always possible in six months or less, and that advancing technology will make further time reductions feasible.

Some major journals, by utilizing now methods and technologies to the fullest, have reduced the time between submission and publication of a manuscript to approximately three months. Frequently, however, the principal cause for excessive delays stems from the backlog that a journal has built up rather than from the editorial and production chain.

Shifting some of the load of research-front communication to semiformal publications should facilitate the maintenance of higher standards in formal media. Additionally, measures should be instituted to cope with such abuses as publishing nearly identical material in several places, a practice fostered by the pressure for publication exerted on scientists, engineers, and practitioners by their employing institutions. The predominant need is for greater differentiation of services with appropriate gradations in price. We advocate the development of new kinds of media and the exploration of alternative subscription arrangements in order to serve, respectively, such different purposes as rapid announcement and scholarly complete presentations, and such different categories of customers as individual and institutional subscribers.

RECOMMENDATION C10

Major scientific and technical societies (if not already doing so) should experiment with :

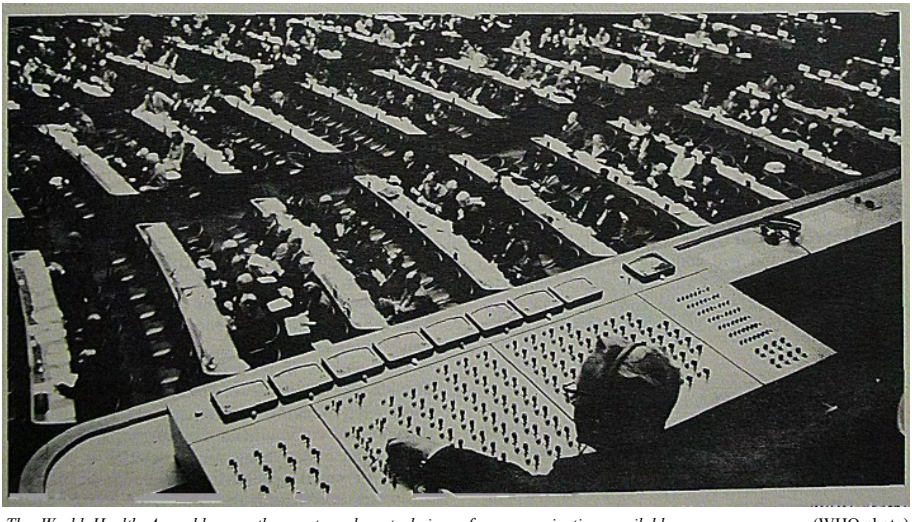
1. A journal for brief, refereed, and promptly published papers (letter journal), with issue period and publication lag not exceeding one month

2. *Organized reprinting, from a group of journals covering either a narrow area or a group of cognate fields, of selected papers recognized as most outstanding.*

Scientific and technical societies also could perform a valuable and much-needed service by facilitating informal interpersonal communication within and between disciplines.

RECOMMENDATION C 1 1

Scientific and technical societies should recognize the need for publishing information that facilitates informal scientific and technical communication in their fields (sometimes referred to as meta information). Information on "who is doing what and where" can appear in newsletters, as supplements to substantive journals, or as separate publications. This support of interpersonal and intraorganizational communication should be but one approach



The World Health Assembly uses the most modern techniques for communication available. (WHO photo)

in a continuing program to facilitate information exchange.

Two technical developments offer major opportunities for effecting the kinds of changes in the traditional patterns of disseminating scientific and technical information that we consider necessary : (a) the processing of information by high-speed computers, and (b) the increasingly flexible, rapid, and inexpensive methods of recording and reproducing graphic material. Increasingly sophisticated forms of texts and figures can be handled by computer-controlled photocomposition, and the ready reproduction of offprints and separates in full-scale or microform versions affords comparable capabilities in the distribution of copy. Of particular importance in this context is the systematic use of computer processes for the purpose of matching available documents to prospective.readers, both being described in machine-readable representation.

RECOMMENDATION C13

Major publishers of scientific and technical literature already are making vigorous efforts in the utilization of modern methods of computer composition; we urge the publishers of the smaller journals of more limited scope to seek arrangements for merging their production activities in order to take advantage of the economies of scale implicit in such modern technology.

Consolidation of the production function will lead not only to economies in what is generally a particularly costly form of printing but also will contribue to the increased availability of full text in machine-readable form for subsequent processing in the production of access tools.

The current bottleneck appears to be the limited capacity of firms that are able to produce machine-readable records of scientific and technical text. Since this demand will continue to expand, special efforts are necessary to train appropriately qualified manpower, thus providing an entry into the information-processing field at a relatively low level of skill.

RECOMMENDATION C14

The scientific and technical societies should give careful attention to needs for and practices in the various types of semiformal communications (report literature, preprints, newsletters, and the like); should subject this material, somewhat selectively, to bibliographic control; and should be prepared to supervise distribution to whatever extent is necessary to preserve a proper balance between the advantages of broader availability of semiformal publications and the continued strength of formal archival journals.

Criticism of the growing number and size of meetings continues to be frequent; and, in fact, many have poorly defined objectives, occur at ill-chosen sites and times, and employ facilities and arrangements that discourage rather than facilitate communication. Often, too many must be attended to get any one story in full, or the frequency of those dealing with temporarily popular subjects becomes too great and the material presented redundant. On the other hand, in terms of the currency of the information exchanged and the speed at which it can be filtered and applied to the interests of the individuals concerned, meetings are among the most effective media of dissemination. We believe that meetings have a crucial role to play in scientific and technical communication and that fulfilling that role more effectively is a major challenge.

RECOMMENDATION C16

National and international meetings can constitute an essential and effective basis for scientific and technical communication. Their predominant role can and should be given a more objective confirmation than the present intuitive backing. Societies and other groups sponsoring such meetings must better insight into the purposes and functions of their meetings and must provide the appropriate logistic arrangements and measures of quality control. Additionally, the economic advantages of large meetings as a means of combining the meetings of overlapping interest groups should be exploited.

The vital significance of meetings lies in the contact they offer with current research-and-development efforts in a field and with active fellow workers. The criticism that numerous small working conferences would be better than large meetings fails to recognize that, if properly arranged, meetings can provide an especially economical way to schedule many such working conferences in which intersecting interest communities can participate. A procedure found effective by some societies is the scheduling of small special-interest-group meetings or forum sessions within the context of a large annual meeting to give participants an opportunity to

question authors further about the work they have presented, to discuss problems encountered in work, and to describe procedures and apparatus more fully.

Our recommendation explicitly abstains from suggesting an increased formalization, nor do we wish to make a general recommendation on requiring preprints of major papers on a program. Although there is evidence that the availability of preprints tends to enhance the effectiveness of meetings and that the material presented at meetings where they were required was on the average no older than presented at meetings of the same society when there was no preprint requirement, the problems of preparing and getting preprints released in time can have an adverse effect on meetings in some disciplines. Therefore, the advisability of providing for the availability of preprints before or at the time of a meeting must be left to the judgment of the organizing committee. One alternative explored in some groups is the submission, shortly before a meeting, of detailed summaries or extended abstracts, which are included in the printed program or are available at the time of registration. Session time for such papers is devoted largely to discussion and questioning. Measures that increase the opportunities ofor interaction, both during and after sessions, greatly enhance the effectiveness of meetings. Especially to be avoided are very lengthy or day-long sessions, with no time allocated to discussion.

In addition to urging meeting sponsors to adopt an innovative approach to the planning of such gatherings, we also suggest that agencies and organizations engaged in research and development continue to support the participation of staff members in scientific and technical meetings. To subject meeting attendance to excessive restrictions in the face of necessary budget reductions would decrease the communications effectiveness of meetings.

RECOMMENDATION Dl

When appointing and advising the groups in charge of arrangements and the scheduling of events at scientific and technical meetings, the sponsoring societies, government agencies, or other organizations responsible for the planning of such meetings should emphasize the importance of providing adequate lime and facilities for personal encounters.

RECOMMENDATION El

Under the over-all guidance of the proposed Commission and of COSATI, *appropriate organizations should initiate and carry out comprehensive analyses of and experiments on the functioning of the different parts of the network of scientific and technical communication as well as of the network as a whole. It should be a long-term policy to provide adequate funds for such studies, and scientists, engneers, practitioners, and — as warranted by the subject of the study — commercial entrepreneurs of abundant experience and imaginative insight should always be active participants.*

To be meaningful, these studies will have to deal realistically with many elusive or complicated factors — for example, inertia in behavior patterns and its effect on the acceptance of new services or the interrelationship of various communication media. The significance of such factors can be properly assessed only by persons with working experience in the fields studied.

STUDIES OF COST AND VALUE

Particularly important among the recommended studies will be those addressed to factors of cost and value. The difficulty of developing quantitative measures of the value of information services, as illustrated by the prevalence of such terms as "user satisfaction" or "document relevance to a request," suggest the need for greater ingenuity and more systematic procedures in the conduct of such studies. Needed measures must include not only the value of different types of information but also the value of the time devoted to actively seeking information and of the waiting or lag time before it is received — that is, the "response time" of an information service. In situations in which a free market exists, the price the user is willing to pay for different information services the number of sources that a user must check in a given field and would assist in deciding when new services are appropriate or feasible.

Factors militating against extensive cooperation and coordination include :

1. Basic conflicts in the goals, incentives, and constraints which influence the various producing organizations (commercial establishments, federal agencies, scientific and technical societies, and others)
2. Fair trade, antitrust, and other legislative acts, which can inhibit cooperative efforts to apportion coverage or to reach agreements on pricing policies
3. Lack of the incentives or resources necessary to effect cooperative arrangements
4. Inertia or pride in service traditions, which inhibits the discontinuation or merging of services

5. The absence of an organization with the mandate and sufficient resources to foster coordination among such services at the national level

6. Technical problems (e.g., different methods of abstracting and indexing, different bibliographic tape formats) and economic problems, which create obstacles to the adoption and use by one service of the products of others

The concept of interconnecting structured files of documents and data ranging in scope from the local to the regional, national, or international level has been advocated for some time as a prime objective in coping with the rising tide of information and the more pressing and diverse information needs of scientists and technologists. Thus, in reviewing developments in this area, Swanson states : "it is no longer necessary... to ask whether networks can be built. It is time, instead, to ask about the sorts of networks that are needed, and to set about providing the innovative software and the flexible, inexpensive hardware to bring them into being." And the author of another recent review article foresees great advantages from the implementation of the network concept at the national level : Perhaps the development in the information sciences field that will do the most to solve the problems that beset scientific information users is the national information network. It will have, through its many supporting components, greater resources and faster access than any of our libraries and information centers could hope to have today. Such interacting groups of information generating agencies, information centers, libraries and switching agencies... should be eventually capable of supplying all kinds of data to all corners.

Current tendencies in government, industry, libraries, universities, and scientific and technical societies toward the operation and development of information networks lend support to these assessments of the need for and potential advantages of network efforts. This trend also is fostered vigorously by :

1. Economic factors and time pressures which encourage the sharing rather than the duplication of information resources

2. Technological developments which permit the integration of diverse multimedia inputs and have the capacity to cope with projected increases in volume of information

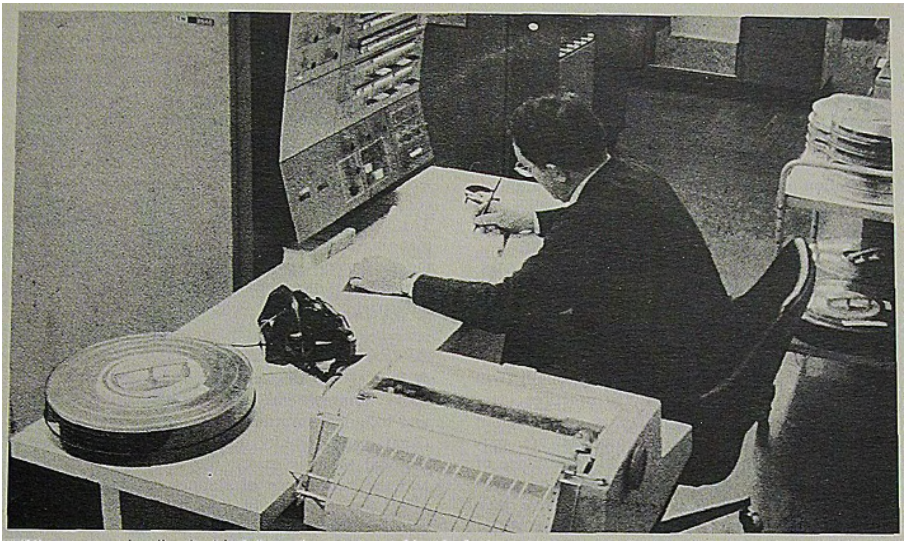
3. Availability in machine-readable form of increasing amounts of scientific and technical information

BASIC SUPPORTING POLICIES

Three conditions have fostered a recent trend toward direct operation of basic access services by the government : first, the assumption of current awareness functions by services that formerlyly served only as depositories or reference sources; second, the opportunities to extend U.S. information programs into other countries on a work- and cost-sharing basis; and third, the availability of funds under government agency mission budgets to initiate such services and merge their costs with those of the activities that they support. The trend recives further impetus from the failure of abstracting and indexing services in a number of disciplines to meet fully the demands placed upon theem.. The scientific and technical community has begun to view with alarm the expanding role of the federal government in the operation of basic access services, a trend which it perceives as potentially jeopardizing the community's control of discipline-oriented services or systems and gearing what should be a long-term stable and orderly evolution to the vagaries of federal budgets in science and technology.

As the first of several basic, guiding principles aimed at clarifying the roles and responsibilities of the government and private organizations, we advocate that all government-sponsored scientific-and-technical-information. Programs intended primarily to serve persons outside government service, or government employees whose activities are similar to those outside, should be managed in whole or in part by the appropriate societies, by institutions jointly created by such societies, or in some instances by commercial • organizations. As a corollary, government agencies, in developing their mission-oriented information programs should use, under arrangements of equitable reimbursement, the privately operated basic information services that can serve as component elements in such programs and should upgrade such services when necessary rather than instituting their own in competition.

We feel that placing the intellectual management of primarily discipline-oriented services in the hands of the appropriate societies or groups of societies, when these exist, provides the insight and guidance generally essential to the effective operation of such services. Scientific and technical societies can enlist the efforts of highly competent and interested members who frequently will serve on a voluntary, part-time basis. Many qualified individuals who feel an obligation to assist with the communications programs of their respective fields of science and technology would not perform similar work on a full-time basis in a government organization, or would do so only for a high rate of compensation.



WHO computer handles health information on a world-wide basis.

(WHO photo).

Further, the scientific and technical community places great emphasis on continuity and the need to ensure the steady evolution of a field in spite of the pressures of shifting fads and fluctuating budgets. In addition, management by appropriate societies affords a division of roles and responsibilities which results in more effective performance in the public interest. The government, in securing, subsidizing, creating, or guiding scientific-and-technical-information services, acts as agent of the people and, therefore, must continually review and evaluate the adequacy of such efforts. When the government seeks to provide these services to the public, rather than to secure them for the public, the substantive experts who should fulfill the role of public advocates and ensure the maximum value and responsiveness of the services often are employed in an operating role which sometimes detracts from or obstructs their power of deliberate review in the interest of the public. When scientific and technical societies provide the necessary services, operating as they inevitably must with government assistance, their performance can be carefully monitored and assessed by the contracting or supporting government agency in the best interest of the public.

The unique attribute of commercial publishing houses stems from the fact that their survival and growth are tied directly to their ability to understand and serve users' needs. This ability has important applications in the service of the interests of both scientific and technical societies and government agencies and should be utilized.

Another area in which policy and guidelines need to be more firmly established is that of ensuring that originators and users of information as well as the sponsors under whose aegis they work share in an equitable manner the responsibilities and costs of the dissemination of information. A central theme of the Weinberg Report was the need to consider the information process in its entirety — from generation through retrieval — as an integral part of the research-and-development effort. Publication alone does not complete the job of making the results available to the society for whose use they were, acquired. With the expansion of the body of recorded information, the likelihood that all the information which could be of use in a given operation will have its origin in the geographic, temporal, or disciplinary neighborhood of this potential point

of application decreases. The condensation of information for use in announcement and awareness services, its consolidation through critical review and synthesis, and its preparation for storage and manipulation in computer-managed structures which provide for search, retrieval, and selective dissemination — all these — are now as much a part of the research-and-development process as the initial publication of results.

A third area requiring attention and appropriate action relates to the slowly knitting, massive, mission-oriented programs of recent years which deal with major social concerns, such as natural resources, education, transportation, pollution, and urban problems. The role of science and technology in the resolution of these problems is not yet clear; therefore, the nature and scope of the information programs that they will require only gradually will become apparent. The policies and practices identified as essential for the effective operation of scientific and technical communication are particularly important in relation to this new range of national endeavors. Adequate data bases and information systems substantially more extensive than those that have heretofore supported our major scientific and engineering efforts will determine to a large extent our success in marshaling the full potential of science and technology for these purposes. Economic, demographic, and sociological information will have to be readily available and used in complete integration with engineering, geographic, and other relevant kinds of information. We urge, therefore, as a matter of policy, that agencies that sponsor major programs of research, analysis, and field experimentation in such contexts as resources management, environment control, trans-urban renewal regard the development of the information systems that their scope and impact require as one of their paramount task.

A final policy consideration is the role of the federal government in providing incentives for exploratory innovations and experiments, particularly those involving large populations and large stores of information. Such experiments frequently involve a capital outlay or a financial risk that would be excessive for a private organization, particularly when the experiment involves large-scale use of advanced technologies. Such innovative experiments often are not priority requirements in connection with specific mission-oriented systems and, as a result, may be difficult to justify in such contexts. Yet, if scientific-and-technical-communication endeavors are to meet the new and increasing demands of the coming years, these experiments must be undertaken promptly and not on a subcritical scale. Further, there is need for coherence and continuity in their planning and administration. We feel that the federal government should establish and fund a single group to plan a unified program of critical experiments of operational scale in scientific and technical communication to find, guid, and support contractors in the conduct of these experiments. The Committee considers it of importance that in planning and directing the conduct of this program the designated government group provide encouragement and incentives to the participation of the industrial-commercial sector.

APPRAISAL AND CONCLUSIONS

A long list of obstacles faces any endeavor to improve arrangements for communicating scientific and technical information at the international level. Great inhomogéneity in the relative development of national services exists; the diversity of languages and the persistence of statutes and policies which affect the free flow of information raise problems; some individual systems are not prepared to cope with the volume incident to international exchange or lack the organizational resources to create and maintain the necessary relationships; suitable standards are as yet nonexistent; and, finally, educated manpower, in both the developed and the developing countries, is insufficient to meet current and projected needs. Under these circumstances, SATCOM views with satisfaction the numerous efforts, which presently are under way, to overcome these difficulties.

The United States contributes in three essential ways to these efforts. First, it offers intellectual support through the ideas and experience of its representatives, who participate in the planning and organization of such activities. Second, it contributes technologically, through the development and application of systems and subsystems (e.g. MEDLARS or the CAS Chemical Compound Registry) that are assuming increasingly important roles in the development of international networks. Third, the United States assumes a substantial share of the financial responsibility for such efforts. For example, the United States supplied slightly more than half the total yearly budget of CODATA during its initial two years of existence and now contributes, through payment of dues, roughly 30 percent of its annual budget; it provides through the NSF one

third of the total annual budget of the ICSU Abstracting Board; and it makes a voluntary contribution equal to its regular dues to COSPAR, which constitutes one eight of the total budget of this activity, as well as funding relevant research through its mission-oriented agencies.

The scope and variety of the international efforts of this country's public and private agencies are in keeping with the interest and the stake which the United States has in the development of increasingly effective international systems for the management of scientific and technical information; therefore, we strongly urge that even greater encouragement and support be accorded them. International arrangements, by their very nature, evolve slowly. If we want to assure the kind of scientific-and-technical-communication system in coming decades that will sustain our research-and-development efforts without imposing an intolerable burden, immediate action is necessary.

In regard to direct cooperative arrangements, major scientific and technical societies and mission-oriented government agencies must encourage the managers of their information programs to explore and develop ways to make access and transfer worldwide in scope, with the work of input and training for use shared among countries. Moreover, there should be explicit involvement, through exploration and direct professional contacts, in the problems encountered by the developing countries. In addition, scientific and technical communities should be able to rely on appropriate administrative support as well as encouragement in such endeavors from the federal agencies that shape and foster this country's foreign relations in science and technology.

The intent of the recently promulgated policy of the Federal Council for Science and Technology on international information exchange is to give added impetus to government-agency efforts to develop cooperative arrangements in a mission-oriented context. SATCOM urges those engaged in such efforts to show appropriate restraint and sensitivity in relation to foreign indigenous efforts in order to permit the latter eventually to become real contributors, operationally as well as intellectually, rather than smothering them by the massive competition of our resources.

In regard to international cooperative research programs, the stewardship of information and data generated by these programs does not always receive the early and explicit attention that it deserves. Sponsors of international research efforts should insist that the following two features become a matter of policy in the central management of any international research program :

1. From the beginning of program planning, information and datahandling operations incident to the conduct of research should receive attention. Planning in this context should include : (a) identifying the requirements for special information systems, (b) determining their design and cost, (c) appraising the impact of the program output on existing information activities in the affected disciplines, and (d) exploring the extent to which the latter can meet, perhaps with modifications, the requirements of the program.

2. Any international cooperative research program directly related to natural or human resources (the probable orientation of most future programs) should plan and provide funding for a special effort to make the resulting information available to less-developed countries in forms in which they can use it effectively.

Of particular current concern in this connection is the International Biological Program (IBP). Present preoccupation with the information storage and retrieval systems for the use of particular program phases should be extended to a comprehensive consideration of the information handling aspects and implications of the Program as a whole. The need for such over-all planning is great, since the biological sciences have yet to achieve in many respects the degree of organization which will enable them to cope effectively with evolving demands. Additionally, the information problems of less-developed countries, aside from what will accrue to those who actually participate, deserve more attention by the IBP planners.

International efforts to permit increased integration of information systems should emphasize to an increasing extent the elimination of present, and avoidance of future, incompatibilities. Though, standardization can resolve many such problems, other approaches require exploration at this as well as the national level. Further, in order to foster cooperative international endeavors and to give them the scope and vigor that they require, SATCOM urges that the U.S. delegations organized in such contexts include knowledgeable representatives of the relevant nongovernment services likely to be affected (Recommendation A9).

Resume de l'article anglais (p. 226) :

PLANIFICATION EN 1970 POUR LES ANNEES 60

Trois rapports publiés l'année dernière sur le système des Nations Unies ont fait couler beaucoup d'encre. M. Judge les a analysés dans trois articles précédents (*) en fonction du réseau « organisationnel » total, couvrant à la fois le système mondial et l'ensemble des problèmes qui agissent et réagissent les uns sur les autres. Après avoir examiné les rapports Jackson et Pearson, l'auteur étudie ici dans ce quatrième article le rapport SATCOM (Committee on Scientific and Technical Communication) créé en 1966 aux Etats-Unis par la National Academy of Sciences et la. National Academy of Engineering pour étudier la situation actuelle et les exigences futures de la communication scientifique et technique eu égard aux problèmes posés par l'abondance et le transfert de l'information. Ce rapport contraste avec les deux précédents (onusiens) par les principes qui sont posés à la base : interdépendance et variété des différents types d'organisations autonomes avec leurs intérêts propres et leurs besoins dissemblables mais non étrangers l'un a l'autre, importance des responsabilités partagées. M. Judge examine une douzaine de recommandations contenues dans ce rapport et en dégage des commentaires. Il s'agit notamment des recommandations sur les services répondant aux besoins de groupes, les services de résumés et d'index, les centres d'analyse de l'information, l'évaluation des résultats, la commercialisation de l'information, le rôle des bibliothèques, la qualité et l'opportunité des publications, la rapidité de publication, les services de tirés à part, les publications facilitant les relations inter-personnelles et inter-organisations à l'intérieur d'une discipline, les méthodes modernes et efficaces de composition par ordinateur, les communications semi-officielles, le rôle prédominant des réunions nationales et internationales, l'importance à accorder dans ces réunions aux rencontres entre personnes, l'opportunité d'analyses et d'expériences concernant le fonctionnement des différentes parties du réseau des communications scientifiques et techniques.

La liste est longue des obstacles qui se dressent devant tout effort pour améliorer la communication de l'information scientifique et technique. Le rapport souligne la part que les États-Unis prennent dans cet effort, notamment par la contribution financière substantielle qu'ils apportent dans les initiatives internationales telles que le CODATA, le Bureau des résumés analytiques de l'ICSU, le COSPAR; il faut donc soutenir l'intérêt de ce pays pour le progrès des systèmes internationaux de communication. Les principales sociétés scientifiques et techniques ainsi que les départements gouvernementaux techniques devront encourager les responsables de leurs programmes d'information à explorer et à développer les moyens de rendre possibles à travers le monde entier l'accès et le transfert de l'information. Dans les programmes coopératifs de recherche cependant, l'accent devra être mis sur le respect des efforts indigènes étrangers. Tout programme international de recherche devra tenir compte de deux points importants : dès le début de la conception du programme, l'attention devra être portée sur l'incidence des opérations de manipulation des données sur toute la conduite de la recherche; un programme international et coopératif de recherche concerné directement par les ressources naturelles ou humaines devra comprendre un effort spécial pour rendre les résultats accessibles et utilisables par les pays en voie de développement.

(*) «Associations Internationales » , mars , avril et juin-juillet 1970.