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COSATI INFORMATION STUDIES- WHAT RESULTS

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ABSTRACT

The four national systems studies of COSATI have made a significant contribution to the understanding and appreciation of the scope and complexity of the so-called "technical information problems." They furnish us with the basic intelligence, an independent audit, and a reservoir of ideas for dealing with a variety of issues which impede the improvements of the domestic and international systems in science and technology. To have a greater impact on the existing systems, however, their finding and recommendations deserve greater publicity. Moreover, what still remains to be done is to find a formula of taking the recommendations, adapting them to the operational realities and bringing them to life. COSATI and the Office of Science and Technology must now face this challenge.

INTRODUCTION

During the past six years the Committee on Scientific and Technical Information [COSATI] emerged as the principal national instrument for the creation of consensus on the national technical information goals, and a useful forum for the national leaders to reach practical [if undocumented] agreements on the scope and form of their future cooperation. The Committee-sponsored studies [1, 2, 3, 4] played an important role in helping COSATI to reach this position of leadership.

There are some who find pleasure in repeating that by and large the COSATI studies were a waste of money which could have been better spent elsewhere. In this judgment they rely on their contention that the impact of the studies on the presently operating systems or services has been negligible. Others maintain that any impact must be measured in terms of the contribution to a national consensus about the national problems, and that many of the recommendations will be implemented in the future.

How soon, and how large an impact these studies can make is, of course, a matter of speculation. There should be little doubt that the studies have made a significant contribution to our understanding of the characteristics and major issues in the national scientific and technical information activities, and to this extent we have received a fair return on our investment. It should be also clear that understanding alone will not produce socially useful results. For this to occur it will take improved implementation mechanisms, additional [or reallocated] resources, and an enlightened leadership at the highest levels of our society; the President's Office of Science and Technology, the National Academies of Science and Engineering, and the U. S. Congress. Moreover, it will take a much greater awareness and a deeper sense of urgency among the members of the R&D community, to encourage this leadership toward timely and substantial action.

Unfortunately, not many people are adequately acquainted with these studies to appreciate the scope and the characteristics of the information "problem." Being uninformed they cannot be expected to exert the necessary influence to effect changes in our pluralistic society. This is particularly true among the managers and sponsors of the various R&D programs who in their system of values still tend to view the R&D communication services as a matter of minor importance, something that can be left to librarians, computer people, or to the individual scientists themselves to work out the best they can. What is even worse, many members of the scientific and technical information community [including the librarians, computer people and information scientists] appear to be similarly unaware of the broad issues and potential solutions identified in these studies. To complicate the matter further, our administrative system is not offering sufficient rewards for the chief administrators of the present federal and private systems to take innovating risks, and thus they do not make an issue when the studies are accessioned, catalogued, indexed, stored on a shelf, and . . . promptly forgotten.

In the next few pages we shall review these studies, look at the major national issues and comment on the solutions offered for COSATI and OST consideration. It is hoped that such a review will contribute to the general understanding of the problems and opportunities in the area of scientific and technical communications and, in turn, stimulate a flow of ideas and proposals to encourage the OST, COSATI and the administrators of federal and private information services to take positive and prompt actions to implement the worthwhile recommendations.

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AN OVERVIEW

Of the five major COSATI-commissioned studies four are completed and one more is on the way*. In this section I shall briefly examine only the first four studies and point out their scope, significance and the possible implications for the scientific and technical information community.

SDC Document Handling Study [1]

This is the oldest and best known study of the lot. Commissioned and completed in 1965 the study concentrates on those R&D components which handle the scientific and technical documents. It describes these systems, and statistically reviews many of their features. It offers a reasonably good preliminary review of legislation and executive orders underlying the present arrangements, and examines twenty of the prior studies and proposals for improvements [6 to 23]. Moreover, it presents, discusses and evaluates several action alternatives for implementation by the Federal Government.

The greatest significance of the report lies in its nonambiguous stipulation of system requirements. Of these, the most important requirement was expressed as an assumption that it is the Federal Government's responsibility to insure that there exists within the United States at least one accessible copy of each significant publication of world-wide scientific and technical literature.

Another significant product of the SDC report is the advocacy of the so-called "delegated agent concept" and a clarified definition of the seat of national responsibility and leadership for creating the national networks. By rejecting the principal SDC recommendation to establish a new independent agency** as a centralized mechanism of planning and program coordination, [the so-called capping agency] the COSATI agreed that only the Office of Science and Technology [OST] can successfully undertake this assignment, and in doing so acknowledged the OST as the legitimate leader of agency efforts.

The SDC Study on Abstracting and Indexing [2]

This study is a sequel to the first one. It concentrates on the document representation subsystems, i.e., indexing and abstracting services. Here the main thrust is toward the role of these services in a future national system, the identification of the current problems, and an advocacy of actions to bring about the desired improvements. As could be expected the recommendations are built on the premises and assumption of the earlier SDC study, yet within a new framework. Here SDC conceives the national system as consisting of three principal components: the information communications, document handling, and data handling. The document handling system is in turn viewed as an aggregate of four subsystems, one of which [the indexing and abstracting services, or as SDC calls them, the Document Representation Subsystem] is the object of the study.

In trying to clarify the scope and characteristics of the problems the study points out three sets of difficulties: those of the users, those of the individual abstracting and indexing [A&I] organizations, and those of the Government. In simple terms the user problem is reduced to user not really knowing what kind of products he wants and what is not available but possible. The problem of the A&I organizations is how to survive in a market which is not self-supporting and how to find a *modus vivendi* with the Government's abstracting and indexing services. The Government's problem is not having a clear concept of the role or range of roles that the A&I services would have to play in the future, and not having a firm handle on the costs and value of A&I services to know whether there is in fact a serious problem and what and whom to support with how much money.

Of key importance is the recommendation which urges COSATI to accelerate the preparation of a set of firm concepts for the national document handling system. SDC sees this an absolutely necessary prerequisite to the document representation subsystem planning.

The Data Systems Study [3]

Carried out by the Science Communications Inc. the study deals with data acquired in experiments, data which describe characteristics and performance of materials, and data which guide and instruct people in the proper use of human artifacts. Its primary purpose was to establish how the various types of data are processed and what can be done to improve these processes. It is one of the most comprehensive "mapping" efforts in this little known area. By displaying to the reader a very complex and generally scattered collection of over 300 activities the study draws a fair portrait of the national and some international efforts to extract, organize, and evaluate specific data about such things as materials, atmospheric conditions, oceanographic currents, population characteristics, and the like.

An interesting departure from other studies is the contention that the presently inadequate knowledge of user requirements and the reluctance of many groups to cooperate in solving common prob-

*The COSATI Task Group on Dissemination prepares a study which deals with the restrictions to the dissemination of technical government reports and papers.

**SDC recommended the establishment of a Scientific and Technical Information Bureau [STIB] reporting directly to the President [2:2-6].

lems, need not deter us from a construction of practical data systems and networks; nor is there a need to put off the certain decision into the distant future. SCI maintains that even if the system requirements were better defined we still would have to proceed in an evolutionary manner by experimenting and learning in practical situations, and then refining and expanding our approaches in future applications. This is a refreshing departure from the views of those who continuously advocate more system studies but never manage to bring themselves to the point of purposeful action.

Informa. Communications Study [4]

This study performed by the American Institutes for Research [AIR] focuses on the role, importance and some of the deficiencies in our informal communications. Its purpose was to measure the national effort expended on selected modes of oral/formal communication and suggest national policies to improve its effectiveness.

The major importance of the study consists of calling attention to this critical mode of communication which is stimulated by two basic needs: the immediacy of response and more flexible channels.

THE CENTRAL ISSUES, RECOMMENDATIONS, AND CHANCES OF IMPLEMENTATION

Having described all-too-briefly each study in terms of its scope, and significance, I would now like to review some of the broad issues considered by these studies, try to look for a possible consensus on the proposed solutions, and whenever appropriate offer comments on their implementation potential.

The Issues of Goals and Policy

This area is fundamental in the eyes of practically all studies, yet one in which the progress has been the most difficult. The basic concern here is about the explicit agreement on the national objectives. What is it that we really want and need? What kind of services should we strive for? How much complete coverage do we need? What are the system's requirements? What are the bench marks against which our progress is to be judged. Here is what the combined studies seem to say about these questions:

- It should be a national objective to attain an economical and easy access to every significant article produced by the world's scientific community.

- Our "system should be capable of telling what is available in the world, point out the data store that offers the best data pertinent to one's problems, and how to gain access to this store.

- For the sake of progress, we need to agree on who should have the national responsibility for the formulation of national policies with respect to the scientific and technical information systems.

- The Federal Government is the most logical entity to accept these responsibilities and to do everything possible to achieve the above objectives.

If these studies reflect the consensus of the U. S. scientific and technical information community (and I have some doubts about this) then it is Uncle Sam who must accept the burden of insuring the welfare and the viability of the scientific and technical sector of our economy; just as he has accepted the responsibility for defense, poverty, civil rights, etc. Indirectly this appears to be an admission that the traditional commodity market is not the place where the information supply is to be regulated. Apparently information is a different kind of commodity, similar to research, arts, and education, which can be supported only through the national "overhead" expenditures.

The Question of Central Controls

Despite the usual apprehension against central controls the studies cannot escape a general agreement that some sort of central coordination either by a special federal agency or by a national commission is needed and would be appropriate. A corollary and persistent feeling is that the technical competence, financial investment and historical involvement of the nonfederal sector make it imperative that this sector also participate actively in the planning and subsequent operation of the national systems.

Three specific control concepts are explored: the Capping Agency [as proposed by SDC], The OST to act as a capping agency, and a National Advisory Council in conjunction with OST [as advocated by SCI]. The idea of the National Advisory Council is especially intriguing as a possible platform for a truly national [as contrasted with federal] interactions on the matters of the national policy and coordination.

What would be the purpose and functions of such a central coordinating mechanism? As can be deduced from the studies and certain recommendations of the COSATI National Systems Task Group [24] the coordinating mechanisms would:

- Define the subject areas for which federal organizations would accept exclusive responsibilities for ensuring effective national information systems.

- Develop policies for:

  - Support and sponsorship of specialized information and data centers

  - Suppor' of communications by non-documentary mechanisms (e.g., meetings)

  - Support of nongovernment publications

  - Education and training of librarians and information technologists

  - Acquisition and translation of foreign documents

  - Copyright and patents in information software and new information transfer technologies

- Review agencies legislative proposals and information budgets and programs in relation to the needs of the integrated national network

- Draft and propose legislation for the integrated national network

- Develop minimal technical and performance standards for information and document activities

- Develop guidelines for cost and other statistical information about information activities

- Develop and maintain long-range plans for an integrated national network

- Coordinate and integrate data and information handling activities of the governmental, professional and industrial sectors of science and technology

What are the chances for the establishment of a national commission or a capping agency to act as the central coordinating mechanism? Frankly, the past events do not inspire much confidence. The creation of a new commission is not a simple matter and will require a greater sense of urgency then the one which exists in the present political climate. Nor is it likely that anyone in authority will seriously advocate the establishment of a new government bureau for this purpose. What appears to be more likely is that there never will be a central coordinating mechanism, of the type embodied either in the capping agency or national commission concepts. Rather we may witness the COSATI, augmented with the non-government members and working in concert with OST and BOB, expanding as a central place where the national areas of responsibility (as advanced by the federal agencies and other organizations) would be identified, and where the responsible agents will be endorsed. Thus COSATI will build a framework in which the information systems can rationally develop and expand with minimum of unintended duplication of holdings, with common planning for coverage and services and with compatibility and establishment of standards where needed. Under this concept COSATI would recognize the declared intentions of the de-facto elements of the network and provide an "organizational chart" where the roles of the responsible agents would be made visible to each other and to the general public.

The Problem of Government-Private Sector Cooperation

The central issue underlying this problem concerns the search for a formula to permit the most appropriate utilization and safeguarding of the private information handling resources. The publishing industry, the indexing and abstracting services, and the data compilation and processing enterprises of the professional societies of the profit-making institutions, are in danger from rising input costs, dwindling clientele and competition from Government's system. No easy and practical solutions are advanced. For example, COSATI endorsement of the SDC Study goes no further than to echo the celebrated Weinberg report(9:18), which already in 1963 warned us that in seeking to insure the adequacy of the federal information system we should be careful not to overwhelm the existing nonfederal systems. In 1965 COSATI could say that "this relationship must be continuously explored and defined with the Government taking such actions as are necessary to maintain a viable system."(24:8). What these actions might be and how such an exploration should be carried out remains a problem. It is regrettable that the Committee does not suggest any formula, since it is unreasonable to expect that the individual federal agencies will ever look at the problems without a bias toward their own competitive operations.

This question of survival is quite critical among the indexing and abstracting (I&A) services. According to SDC, the services find it difficult to maintain, much less improve, the current level of service in the face of increasing costs from a rising number of information sources, increases in the volume of foreign literature, and shortages of trained personnel(2:41). Even more difficult is the problem of certain data compilation systems which do not have as numerous clientele as

*COSATI is now considering proposals for the nation-wide assumption of the technical information responsibilities in several areas. If COSATI and the Federal Council goes along with this proposal, this would signal the beginning of the implementation of the so-called "delegated agent concept," and a trend away from the "capping agency" ideology.

most of the I&A services, and where the input costs are very high*. Here the SCI advances a thesis that the Federal Government should provide not only the developmental support of data systems, but also the operational support in whole or in part(3:IV-38). The study notes, however, that this support should not preclude a possibility that the data systems could, or should be managed by nongovernment groups.

In this area the events of the last ten years tend to support my earlier contention that one should not expect the existing groups to develop a willingness to cooperate in schemes where the purpose is generally intangible, and perhaps only of sentimental character [21:315]. This is even more important in our efforts to develop new forms of international cooperation, where it takes ten times as long to reach meaningful agreements, and is even more difficult to implement them. Ultimately, however, the question of government/nongovernment cooperation will have to be faced with somewhat more concrete action proposals. These, in turn, will depend heavily on our ability to agree on goals, develop channels for cooperation, clarify institutional roles and reaching agreements on financial responsibilities.

Knowing the System's State of Health

A recurring and persistent theme of all four studies is that no one really knows or understands the present system but that such knowledge is essential for the formulation of the future policies. Here is a consolidated view of what the studies advocate:

- An inventory of relevant legislative provisions
- Comparative data on cost and budgets of the various services
- Inventories of current document holdings
- National Index of Scientific and Technical Data**
- An information center on the design, development, operation and management of scientific and technical data systems
- Statistics on direct and indirect communication costs
- Criteria for economic performance of current information handling efforts
- Knowledge of critical factors important to the development of large-scale systems
- Effective methods of predicting future data and information requirements
- Reliable data on the characteristics, cost and utility of particular types of document representation
- Knowledge of human and human-machine communication behavior

To some extent the list should be looked upon as COSATI's or OST's management data and research requirements. None of these requirements are simple. On one hand, to acquire the necessary management data it is necessary to work out the definitions, establish reporting schedules and have a ready analytical plan to know what data to acquire and in what form. Moreover, there is a tremendous job ahead to induce the information processing organizations both to change their internal data recording systems and provide the appropriate data to some central point. Since such changes are costly and uninviting one must be ready to answer such questions as, "What is the data to be used for" and "What could you do even if you had the data." [On the other hand, to acquire some of the fundamental knowledge about the communication behavior, economic phenomena of information industry, or to perform experiment to test the predictive methods for future information requirements two other elements must be present:] (1) well stated researchable problems, and (2) money (or an ability of directing other federal agencies to pay for the research). All of this is of course possible, but not in a setting of part-time involvement (as in COSATI) or for a harassed three-man OST staff.

In all fairness to COSATI and OST, they have been very active in this area, and considering their limitation, relatively successful. The four COSATI studies (plus the one underway) constitute only a partial list of the COSATI fact-finding efforts. Other efforts are represented by such products as the COSATI Inventory of Information Science Technology Work in Progress, (a computerized data bank), and a Directory of the Federally Supported Information Analysis Centers(26). A compilation of the relevant legislative provisions is also currently underway in one of the COSATI task groups, as is the attempt of developing uniform criteria for use in reporting funding data for the NSF Federal Funds for Research and Development Series in another. Admirable as these efforts are, they are only a beginning of what is really needed to acquire adequate understanding of the present systems.

*For example, SCI reports that the U.S. geodetic satellite GEOSI after one year provided 100,000 sightings which after considerable calculation resulted in a table of "J" coefficients and a map showing average and anomalous gravitational values. The complete cost estimates are difficult to obtain, but SCI estimates that as many as 200-300 engineering and scientific personnel were involved in the data reduction and analysis(24-278)

**The word index is explained to mean a collection of indices covering data resources useful within the individual technical communities(3:II-9)

Network Switching and Referral Mechanisms

Here we come to the heart of many problems underlying a possible construction of the national systems. The COSATI-endorsed position is that each system within the national network should have its own index, switching center, and referral apparatus(24:13). Although COSATI recognizes the need for a single switching center for the network as a whole, it has yet to determine the most appropriate form for such a switching center. [Neither is there any evidence that COSATI has come to grips with the vocabulary and vocabulary control in the network each system would be autonomous.] This problem is especially significant in view of yet another COSATI system requirement for a decentralized local access to documents and information. Under such conditions the questions of vocabulary convertibility are further complicated by the problems of standardization of forms used in processing and serving of requests, and establishing of convenient procedures for service charges. If one considers that such a network would serve scientists, technical personnel, scholars, students, generalists and specialists, administrators and librarians(2:48) each with their unique data and information requirements, the question of switching and referral apparatus acquires a special significance.

In the area of data, the SCI study notes that although switching networks and computers are frequently mentioned, the automated data service networks, for all practical purposes, do not currently exist. Among the reasons are the inability to justify such services in the face of uncertain users requirements, currently high cost of data transmission, and the difficulties of structuring and maintaining sufficiently broad data banks, to serve diverse user interests. Moreover, at the moment and in the foreseeable future there will be a greater need for national scale data handling systems which operate within the various scientific and technical communities rather than between the communities. This view explains the SCI recommendation that serious tests should be undertaken to test the feasibility of centrally supported, decentralized data resource centers as an alternative system concept of data switching networks(3:11-35).

Although the technical people are generally considered the most efficient switching and referral mechanisms, they too may need augmenting. The American Institute for Research study observes for example, that the knowledge of the individual scientist who can give him information and advice, and whom to consult, is limited. The need for consulting directories is especially urgent when questions are related to other disciplines, or when the directories of scientists presently contain insufficient and out-dated information(4:159) Clearly the question of the switching and referral mechanisms needs more thought and careful study. As of now it still remains the central and largely unexplored issue of national science information networks, and consensus on the most appropriate approach is not yet in sight.

Standarization

Perennial, and not likely to be resolved soon, is the issue of what to standardize, when to standardize, and why to standardize at all. The prevailing argument is that some minimum standardization is required to gain efficiency. Who should develop standards and how to secure their adoption is a corollary set of questions which receive extensive attention in the studies.

The question of standards may be divided into performance standards and technical standards. The SDC study defines this distinction by pointing out that the former are concerned with such matters as completeness of coverage, speed of service, nature and quality of service to the users, etc. Technical standards on the other hand, deal with such problems as cataloguing standards, bibliographic representation, methods of classification, standards to be used in the application of automatic techniques, etc.,(1:5-5).

What are the specific system requirements for standardization? Here is a partial review of what the studies see as important elements in need of standardized approach:

- Standards for document reproduction and specification of techniques for reproduction
- System Vocabularies
- Software and hardware aspects of machine system application
- Data Classification Standards
- Standard methods for processing and servicing of requests for documents
- Standards for document representation, i.e., standards for abstracts and indexes
- Standard criteria for system evalutions
- Standards for Government restrictions on document release

No clear cut answers are readily available. The sole exception is a set of options for the document representation standards offered in the SDC Indexing and Abstracting Study. On purely technical standards the uncertainty is even more evident when SCI questions whether the standardization of data, formats and data quality can be beneficial or detrimental to scientific and technical work(3:IV-19) and concludes that it will be the scientists in specific areas of research who will have to make the final determination whether standardization of measurements and data is feasible or desireable(3:II-11).

Here the COSATI record is relatively satisfactory only in the area of Thesauri. The Guidelines for the Development of Information Retrieval Thesauri should reduce disparities

among the various operating information systems and should promote a consistent approach among systems in the initial stages of development. Their popularity and future impact is evident in the Guidelines being COSATI's "runaway" best seller - some 3,500 copies sold by GPO alone.

Resource Allocation Process

As if through a collusion, all studies consider the national allocation of resources to the scientific and technical information to be inadequate and often irrational. This, of course, is not a new phenomenon. Practically every national study [on any subject] will argue that the field under investigation needs more resources. In the final analysis the allocation of adequate resources to a given area will be guided both by [1] the allocator's system of values, i.e., what values they assign to such activities as documentation systems versus more scientists in a laboratory, and [2] to the intensity of popular demand for services. Of these, the second is more important, vindicating the old adage, "the squeaking wheel gets the grease."

How many resources would be "adequate" remains a dilemma. The COSATI studies skirt this issue with a recommendation for more explicit and consistent allocation criteria and adoption of multi-year budgetary plans(2:51). The sole exception is the SCI Data Study which bravely suggests that each Federal research and development program be required to allocate a minimum percentage of its budget to husbandry and conservation of the scientific or technical data generated by the program. According to the SCI formula, basic research might be asked to allocate 10%, the applied programs 15%, and development programs 5% to this function(3:11-10). Whether this would considerably increase the total available funds for information systems is not stated, simply because no one has any firm knowledge how much is now being spent for these purposes.

Education of Users and the Middlemen

While the ambition to improve our system constitutes the driving force behind many of the present efforts, there is also a persistent belief that the existing information services are not properly used. The most frequently mentioned reason for this state of affairs is the user ignorance of what is available and how to gain access to the available information. Thus, there is a genuine requirement for the education and training of both the ultimate user and the information specialists who as middlemen provide human links to the evergrowing variety of services and systems. Unfortunately, both the agency information budgets and those of the not-for-profit sector seldom include the necessary investments for the marketing of services, which should be one of the most effective user training tools.

COSATI's follow-up on the various suggestions for training and user aids has been vigorous but only partially successful. Perhaps the most far-reaching progress has been made in getting the Civil Service Commission to establish a new professional classification series for technical information workers.* This should have some impact on the professionalism of the people who provide user services(27:14). Of more limited success have been COSATI-sponsored orientation courses for the Government R&D personnel to acquaint them with the available services. The effort has now been curtailed but may lead to reference books to aid the users in dealing with the present system peculiarities(25-7).

System Research and Experiments

Despite considerable Federal sums spent for communications R&D, and in the face of remarkable advances of the past twenty years in computers, all studies point clearly to a need of a better national management methods in the utilization of modern communication techniques, as well as in the generation of new knowledge of special relevance to the scientific and technical information handling technology requirements.

The Informal Communications Study, for example, expresses the need for a nation-wide communication network for research scientists and engineers. Here is a classical case for utilization of potentially available technology. As proposed, the network would operate in a fashion similar to that of the Department of Defense's AUTOVON. The requirements include the scrambling devices to permit uninhibited discussion of classified material, and the means of transmitting tables, charts, motion picture demonstrations, which are vital for the precise and detailed communications of research scientists and engineers. Here is an area for a number of system experiments; yet there is no coordinating and funding mechanism today which can even contemplate such a venture on behalf of the scientific and engineering community.**

On the research side of the coin, the central theme of the studies is that the scientific and technical information community must play an active role in stimulating the phenomena research (basic research) and systems research (prototype studies). There is an implication here that it is the Federal Government's responsibility to determine the needs, define the priorities and devise funding support for this R&D. The SCI study goes even further, by arguing that the Federal Government should budget at least one-tenth of one percent of its total annual R&D

*GS-1410 and GS-1412 Series

**Direct dialing, leased, telephone network

*Such a system may eventually become available as a discard of our intelligence or command and control enterprises.

expenditures for research on techniques and procedures for managing and handling of scientific data(3:II-B). Who would make such determination and how all this would be administered is not clear.

The COSATI's performance in this area has been uneven. For example, COSATI accepted the SDC position to recommend tasks to be undertaken in the development of a coordinated plan and criteria for Federal support of experiments in the technology of information sciences, including prototype information systems designated to provide data for the integrated national network. After four years there is no evidence, however, that the COSATI Panel on Information Science Technology has done much about it. COSATI has also added a requirement for large scale experiments(24:18) which would be capable of handling actual problems and which could grow or evolve into operational systems. By citing the MEDLARS project at the National Library of Medicine, and the AEC and NASA computer-based abstracting and indexing services as the examples of large scale experiments, however, it appears that COSATI is missing an important point. The point is that these are "experiments" only loosely coordinated at the national level and therefore not likely to provide many of the rigorously tested design data which could be useful in the design of the eventual information and data networks. On the other hand, COSATI performed useful service in building up a reasonably adequate inventory of the information science and technology R&D projects which are conducted or supported by the Federal Government.* In doing so it has established a platform from which it can now move to a more difficult task of recommending additional R&D needed for the eventual engineering of the national information networks.

CONCLUSIONS

What can be said after this rather lengthy yet very incomplete review of 2,155 pages of data, discussion and advice? What conclusions are warranted, or indeed possible?

To me, it appears that COSATI [and the two Federal agencies that contracted and administered the studies] have made significant contribution in providing the scientific and technical information community with an opportunity to become aware of the wide range of strengths and weaknesses in the U. S. technical information systems. In doing so, COSATI has built a base for the intelligent and rational discussions of the issues and thus paved the way for future progress. And this is not a waste of money.

On the other hand, no one has a right to assume that the knowledge of the problem and the ability of coping with it in a real-life environment are of the same cloth. The innovation at its best does not displace old technology but supplements it. The progress will not come rapidly unless there is a popular and clear demand for it. A better familiarity with the four studies should help ASIS members to express their demands in a more coherent manner, as well as stimulate additional research to learn how to move new technologies to practical applications.

While COSATI accomplishments and dealing with the study recommendations are uneven, we must always remember that many recommendations were expressed in non-operational terms, i.e., they were essentially the so-called "motherhood statements." To be able to implement such recommendations it takes much refinement, integration and meshing with the existing institution and processes, and just plain compromising. This takes time, effort and a driving leadership. Given these requirements and the realities of a committee structure we need not be ashamed of the progress achieved so far.

On the other hand we should not ignore the saying that the conditions for building of national networks is not unlike that which existed some 450 years ago in medieval Italy. Then, as now the root of the matter was how to weld the semi-independent entities, whose source of power came not from the Prince but from their own internal strengths, into a nation-state capable of providing greater benefits for all citizens. Then, as now, there were some who have felt that such benefits would not be worth the loss of their autonomy and independence of action. [It is said, they defended themselves by the time-tried and tested method of withholding information to the seat of central decision making, and by making their own unreferred decisions.] What was needed then and needed now was independently collected background information, a strategy to quell the internal strife, and the means of applying a system of incentives and punishments to induce the barons into considering general welfare ahead of private adventures.

Finding a better formula for an orderly processing of study recommendations and their implementation is one of the most pressing managerial problems. Although better advice and action alternatives [and additional studies] will always be needed, the critical need is for a more practical implementation mechanism to take the advice and bring it to bear on a real-life situation. This is something which as yet has not been well devised and tested in COSATI and OST frameworks.

Finally, with every passing day it becomes clearer that the systems approach, so beneficial in the optimization of various military missions, is not equally successful in optimizing the complex social institutions and activities of the present de-facto technical information system. Thus the "new" concept of letting COSATI become the central point for the definition of systems' responsibilities offers perhaps a more

*At this time COSATI has an on-line access to a data bank "Inventory of Information Sciences Technology Work in Progress." [25:5]

effective, if not more rational, approach.

REFERENCES

1. System Development Corporation, Recommendations for National Document Handling Systems in Science and Technology, Vol. I & II, September 1964. (AD 624 560).

2. System Development Corporation, A System Study of Abstracting and Indexing in the United States, December 1966. (PB 174 249)

3. Science Communication, Inc., Study of Scientific and Technical Data Activities in the United States, Vol. I, II & III, April 1968. (AD's 670 606, 670 607, 670 608).

4. American Institutes for Research, Exploration of Oral/Informal Technical Communication Behavior, August 1967. (AD 669 586).

5. U. S. Congress, Availability of Information from Executive Agencies, Hearings, House Subcommittee on Government Operations, 84th Congress, 2nd Session, Government Printing Office. Mar. 7-9, 1956.

6. Stanford Research Institute, A Draft for a National Technical Information Center, Jan. 1958. (SRI Report).

7. Crawford, J. H., et al, Task Report to the President's Special Assistant for Science and Technology, Scientific and Technological Communication in the Government. Apr. 1962.

8. Cahn, Julius N., "BITS-Bureau of Information for Technology and Science," Proceedings of the Engineering Information Symposium, Joint Engineers Council of New York City, January 17, 1962.

9. The White House, President's Science Advisory Committee, Science, Government and Information, Government Printing Office, Jan. 10, 1963. (Weinberg Report).

10. Management Technology, Inc., A National Scientific and Technical Information System, April 1963. (Management Technology Report).

11. Simpson, G. S., Jr., A Pentagon of U.S. Scientific and Technical Information and Data Service, a working paper. Battelle Memorial Institute, Columbus, Ohio, November 1963. (Simpson Plan).

12. Warren, Stafford L., The National Library of Science System and Network for Published Scientific Literature, A memorandum for the President, 17 February 1964. (Warren Report).

13. Heller, Robert, A National Plan for Science Abstracting and Indexing Services, Robert Heller and Associates, 15 March 1963. (Heller Study).

14. Taube, Mortimer, Proposal for the Establishment of a Government Corporation To Create and Provide Services from an Integrated Store of Scientific and Technical Information, Documentation Inc., 30 July 1963. (Taube Report).

15. Kelley, J. Hilary, Memorandum for Dr. Jerome B. Wiesner, Government Science Package, Office of Science and Technology, 23 Nov 1963. (Kelley Report).

16. U.S. Congress, National Research Data Processing and Information Retrieval Center, Hearings, House Committee on Education and Labor, 88th Congress, 1st Session, Appendix to Vol. 1, Parts 1,2,3, Government Printing Office, 1963. (Pucinski Plan).

17. Jonker, Frederick, et al, A Model Information Retrieval Network for Government, Science, and Industry, Jonker Business Machines Inc., May 1964

18. Goldberg, Stanley A., et al, Engineering Data and Information System (EDIS): Office of the Chief of Research and Development, Department of the Army, July 1964. (AD 447001) (Goldberg Report).

19. Mayo-Wells, Wilfrid J., Organization of a National Scientific and Technical Information Center, 7 October 1963. (Mayo-Wells Report).

20. Kelsey, F. Ellis, A National Drug Information Clearinghouse, Public Health Service, 8 December 1964.

21. Hoshovsky, A. G. and Album, H. H., Toward A National Technical Information System, Office of Aerospace Research, U. S. Air Force, January 1965. (AD 625 496) (Hoshovsky-Album Plan).

22. U. S. Congress, Summary of Activities Toward Interagency Coordination. Senate Committee on Government Operations, Document 369, 89th Congress, 1st Session. Washington, D. C., Government Printing Office, 1965. (The Humphrey Hearings).

23. Licklider, J. C., Report by an Office of Science and Technology Panel on Scientific and Technical Communications, Executive Offices of the President, 8 February 1965.

24. Committee on Scientific and Technical Information, Recommendations for National Document Handling Systems in Science and Technology, Federal Council for Science and Technology, November 1965. (AD 624 560)

25. Committee on Scientific and Technical Information, Progress of the United States Government in Scientific and Technical Communications, (1967), Federal Council of Science and Technology, 1967. (PB 180 867).

26. Committee on Scientific and Technical Information, Directory of Federally Supported Information Analysis Centers, Federal Council of Science and Technology, April 1, 1968. (PB 177 050).

27. Committee on Scientific and Technical Information, Progress of the United States Government in Scientific and Technical Communications (1965), Federal Council of Science and Technology, 1965. (PB 173 510).

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13. ABSTRACT

The four national systems studies of COSATI have made a significant contribution to the understanding and appreciation of the scope and complexity of the so-called "technical information problems." They furnish us with the basic intelligence, an independent audit, and a reservoir of ideas for dealing with a variety of issues which impede the improvements of the domestic and international systems in science and technology. To have a greater impact on the existing systems, however, their finding and recommendations deserve greater publicity. Moreover, what still remains to be done is to find a formula of taking the recommendations, adapting them to the operational realities and bringing them to life. COSATI and the Office of Science and Technology must now face this challenge.

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