FEDERAL INFORMATION SYSTEMS AND PLANS—IMPLICATIONS AND ISSUES
(PART 3)

HEARINGS

BEFORE A

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STATEMENT OF DR. EUGENE GARFIELD, PRESIDENT, INSTITUTE FOR SCIENTIFIC INFORMATION

Dr. GARFIELD. Mr. Chairman, I would like to depart from what we planned. I did bring, for the members of the committee, a few brochures illustrating the range of information products that the Institute for Scientific Information provides. There is also a reprint on the information-conscious society.

Rather than read the prepared remarks about the Institute of Scientific Information, I have some comments which may be more germane.

Mr. MOORHEAD. Without objection, your attached materials will be made a part of the record.

[See p. 884.]

Dr. GARFIELD. You have heard from three Washington-based companies. I hope you do not get the impression that the IIA consists solely of Washington companies.

In fact, some would say that Philadelphia is recognized as the information capital of the world. I refer not only to the for-profit companies that are members of the IIA, but also many other private, nongovernmental information activities in Philadelphia and elsewhere in the State of Pennsylvania.

Information, like science and technology that generates it, can liberate or enslave man, depending upon how it is used. It is an old cliche that knowledge is power. But the advent of the information revolution has given personal meaning to that phrase for the individual citizen. Freedom of access to information is not the same as free information. All information involves the cost element. What is often confused is just exactly who is picking up the bill for that cost.

In my opinion, the Freedom of Information Act becomes meaningless for the individual citizen until and unless the financial means whereby he obtains access is provided. For example, right now every Member of Congress provides an enormous amount of information, free of charge, but that in no way means without costs to his office or some tax-supported or other agency.

For those and a variety of reasons I have, in the past, proposed before the National Commission on Libraries and Information Science the idea of a National Information Funding Authority. This authority, I believe, could eventually realize the objective stated by Mr. Moorhead in earlier hearings, that is, "to improve the full range of public information services provided by Federal agencies."

In a real sense, we live in an age where there is extensive information poverty in the midst of information plenty. I discuss this problem in the reprint before you, concerning the needs of the information-

conscious society. In many respects, the problem of information dissemination and utilization today is comparable to the problem of human nutrition. Money for "priming the pump" is needed to educate the population in the use of newer information technologies. This is comparable to a similar need in reorienting the population with regard to nutrition and health. Indeed, these two analogous problems overlap in my own company. A growing number of educated citizens are already using these services, that were designed for professionals, to bypass the inadequate information transfer process. In the past we relied on the doctor, the lawyer, and other professionals. Professor Fano refers to this very point in part 1 of the committee's hearings (see p. 3).

The information industry, although it is already a multi-billion dollar one, is only in its infancy. As we move into the information era, we must recognize that in excess of 50 percent of the gross national product will revolve about the so-called knowledge industries. I respectfully refer the committee to the work of Prof. Fritz Machlup of Princeton University. In 1962, 29 percent of GNP was already knowledge based.

It is for good reason that you should be concerned with providing the means to all citizens whereby they will benefit from these changes.

Mr. MOORHEAD. Thank you very much, Dr. Garfield.

[The material referred to on p. 883 follows:]

THE ROLE OF GOVERNMENT, PROFESSIONAL GROUPS, AND PRIVATE ENTERPRISE IN SCIENCE COMMUNICATIONS [1]

(By Eugene Garfield, President, Institute for Scientific Information, Philadelphia, Pa.)

The growth of research and development has increased the need for improved methods of disseminating and retrieving scientific information. What is not apparent, is whether or not there is a crisis in handling scientific information; and if there is, (1) how should it be overcome? (2) who shall provide the facilities to satisfy the needs of the scientific community, the public, and the government? and (3) what shall be the roles of private enterprise, professional societies, nonprofit organizations, universities, and government?

PRIVATE ENTERPRISE

In a free economy it is the consumer who ultimately decides which services and products are marketed. The creative role of entrepreneurs is to identify and satisfy consumer requirements. It is a basic assumption of our economic system that private enterprise should be assigned the principal opportunity for distributing goods and services. This would include scientific and technical information services to consumers, of which the government is one of the largest.

PROFESSIONAL SOCIETIES

Professional societies can help identify user requirements when they are not anticipated by private enterprise and can stimulate the satisfaction of those requirements by private agencies. It is natural that such societies will be sensitive to the self-interest of their memberships; but, particularly when they are the recipients of government charters, they assume an obligation to place the public interest first.

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[1] Presented at the meeting of the Scientific and Technological Communications Committee, National Academy of Sciences, held in New York, N.Y., on Dec. 16, 1966.
Originally prepared on June 21, 1965, for submission to the Office of Science and Technology, Washington, D.C. This revised version prepared on June 15, 1965.

NONPROFIT ORGANIZATIONS

Nonprofit organizations should not be entitled to special government subsidies in order to undermine the competitive position of private business organizations.

UNIVERSITIES

The primary mission of universities should be to educate and to perform basic research, but education and research is not a domain over which the universities should have exclusive reign. Universities should not engage in scientific and technical information activities that can be performed by commercial organizations.

GOVERNMENT'S RESPONSIBILITY

The Government has the responsibilty for seeing that the public interest is served and that the consumer is protected from abuses of business, professional, and other groups. Where the professional group fails to meet its basic functions, the government should then provide the necessary stimulus to private enterprise to get the job done. The mechanism for getting the job done will vary from case to case but it is neither necessary nor proper for government to conduct enterprises when private agencies are ready, willing, and able to carry on the jobs.

PAST INHERITANCE

These introductory statements, like most platitudes, are subject to criticism and are not applicable in every instance. However, we have inherited a very complex socio-economic structure. General principles are necessary at the outset so that extrapolations can be made to the specific problem of the information explosion.

CAN THE INFORMATION EXPLOSION BE CONTROLLED?

A great deal has been said about the information explosion. The Institute for Scientific Information does not underestimate the size and difficulty of the information-handling problems. However, we believe they have been considerably exaggerated. This exaggeration has led, on the one hand, to a feeling of helplessness. On the other hand, it has led to suggestions for ill-defined multimillion dollar information systems.

HOW MANY SIGNIFICANT JOURNAL ARTICLES?

Estimates of the number of scientific and technical journals published range from 50,000 to 100,000. However, ISI's studies indicate that from 1,500 to 3,000 periodicals account for well over 90 percent of the significant literature (1). Of these, about 300 account for almost half the articles published! Indeed, even this fraction includes considerable redundancy. Probably between 300,000 to 500,000 scientific articles a year are involved in this group of journals. To this should be added an annual output of approximately 100,000 U.S. and foreign patents and 100,000 "unpublished" technical reports. These figures provide upper limits at the present time. Possibly an additional 100,000 "articles" appear in multiauthored books, conference proceedings, and other similar materials—much of which is repetitious but sometimes useful.

EXAMPLE OF CHEMISTRY

For example, in the case of organic chemistry, a field which is highly productive of literature, less than 50 journals account for more the 90 percent of the new chemical compounds reported (2). The same number of journals accounts for 25 percent of the entire output of Chemical Abstracts! (3)

OUTPUT APPROACHING 1 MILLION

The world's output of useful scientific articles is approaching 1 million per year. This is a staggering total when viewed from the desk of an individual. But this is not an alarming number to those who are familiar with large-scale information handling systems. Only a small fraction of this total is of interest to any given individual. And it is not unusual to find individuals who are capable

of handling and absorbing pertinent information from as many as 200 papers per week, or 10,000 per year—about 1 percent of the world's total. And nonlaboratory based scientists may handle as many as 500 to 1,000 per week. The problem is of great magnitude, but approached correctly, it is manageable. But what approach shall we take?

MULTIFACET APPROACH REQUIRED

There is no single method of handling scientific information which has been clearly established as the most desirable. Therefore, the most reasonable course of action for the Government at present, is to support several competitive systems. In the long run, the consumer can make the final choices. To support two or more competitive systems does not necessarily imply outright duplication, since each system may emphasize different parameters or utilize different techniques.

INFORMATION SERVICES ARE STILL NOVEL

At the present time the scientific community is not sufficiently generally prepared to adopt highly sophisticated and costly information systems. Scientists have grown up in an environment in which, for all intents and purposes, scientific information has been provided free or at artificially low costs. The "information explosion" is synonymous with big science. The new situation requires that the actual costs for scientific information be recognized. As the President's Science Advisory Committee specifically stated, a greater percentage of science's resources "must inevitably go into handling the information that science creates." (4)

GOVERNMENT'S ROLE

The Government has a major responsibility in helping to facilitate the use of modern information systems by the new generation of scientists. It is essential to the proper use of the large funds which government expends in support of research and development. To accomplish this requires appropriate infusion of money at the individual and institutional level. This can be done either by direct stipend or by directing that a given percentage of all research and development funds be used for information. An infusion to the scientific community, over a 3- to 5-year period, of funds for the purchase of information services, will then stimulate private entrepreneurs to invest capital in new and competitive systems and services.

UNIVERSITY COURSES

Simultaneously greater emphasis on science information utilization in university undergraduate and graduate instruction is badly needed. Every science major should take one or more courses on scientific documentation and use of modern information facilities. A pitifully small number of schools provide such instruction which should be required by accrediting committees in professional societies and by granting agencies. The government can stimulate establishment of such instruction through grants for this specific purpose.

PRIVATE INVESTMENT HAS BEEN DISCOURAGED

At the present time, it is almost impossible to obtain support for private investment in scientific information systems. There has been the constant threat of government centralization or the monopolization of the information field by government subsidized nonprofit organizations. These are not mere speculations. These are observations based on actual experience in seeking investment capital to undertake new information ventures. The government should not put itself in the information science business if private enterprise can do the job.

SHORT-TERM SUPPORT OF NEW VENTURES

In addition to "priming the pump" by making information dollars available to scientists, there are other ways for government to spur innovation in information handling. Even under the best investment climate there will be new ideas and services that may be too costly for private enterprise to develop quickly. As with innovations in other areas, there is considerable inertia in the acceptance of new information tools. Individuals and organizations are not quick to modify methods especially when they may have heavy investments in old systems. The Government can help by active encouragement and support of new ventures for a

short period. This should only be done when the organization seeking temporary subsidy is also willing to risk some of its own capital and resources.

NONPROFIT ORGANIZATIONS AND GOVERNMENT SUBSIDY

A great difficulty faced by the Government is the inheritance of the past tradition wherein it is assumed that nonprofit activities are virtuous and that nonprofit institutions and traditions must be preserved regardless of cost or public interest. In the face of this tradition and strong political pressure from special interest groups like the ACS, AIP, and AIBS, it may be difficult for agencies like NSF to modify policies along the lines suggested herein. But should NSF, OST, or any government agency, foster the special interests of these groups at the expense of the taxpayer? During the past decade, government agencies have lavished grants upon Chemical Abstracts (ACS), Biological Abstracts (AIBS), and Physics Abstracts (AIP). Many so-called "research" grants have been indirect subsidies.

NSF-ACS GRANT CONTRACT

The most recent grant-contract between the NSF and ACS needs to be studied critically. The contract was negotiated as though CA was a sole source—no other organizations capable of carrying out the contract were contacted. No request for bid was issued. Private industry was not given an opportunity to demonstrate if it could supply the required services at a lower price. The contract will help establish Chemical Abstracts as a virtual monopoly. The contract subsidizes CA at the same time that the only competitor of CA, Index Chemicus (IC), is already operating a chemical registry system containing 700,000 compounds—a system in which a millilon dollars has been invested. Furthermore, during the recent period of its negotiations with CA, NSF declined proposals by IC for research on systems which had been recommended for study by the NAS–NRC.

Further evidence that this contract has been negotiated to establish CA as a monopoly is the subsequent negotiation between the National Cancer Institute and CA for an additional $400,000 contract. The requirement for this contract is that it be compatible with the CA system. No RFP was issued for this contract either.

At present the CA–NSF contract is almost pure giveaway. The CA–NSF contract contains no direct statement that all data, methods, programs, et cetera that are created during the contract shall be made available directly to any other individual or group willing to pay the costs of duplicating the data created. The contract allows NSF to obtain this information, but this in no way protects others, like IC, who may wish to obtain this information. The NSF has no established policy in this regard. Government agencies, such as the National Library of Medicine, have refused to make such tapes available (5). Since these policies are known to COSATI, in which NSF participates, what reason is there to believe that CA tapes would be made available through NSF to private organizations? Indeed, NSF would not make available the complete terms of its contract with CA.

There is absolutely no protection in the CA–NSF contract for the taxpayer against discriminatory pricing policies. In the past, members of the ACS could obtain CA at $700 per year, while public or government libraries had to pay $1,200 per year. In addition, sections of CA are sold to its members at extremely low prices, which do not reflect true costs.

IS A COMPUTER CHEMICAL REGISTRY SYSTEM NEEDED?

There is no clear-cut evidence that the CA computer chemical registry system is needed by any but a small group of companies. These companies are, at present, unwilling to organize themselves, or pay a private group for the operation of such a service. This is not to say that a computer registry system may not be useful. But it does not follow that the general taxpayer should unwittingly support such activity. The chemical industry has enormous resources. Shouldn't the industry support the development of the registry system? When the IC was started, the pharmaceutical industry was asked to, and responded with, support to the service through subscription for a period of 2 years. When an abstracting service for pharmaceutical literature was wanted, the pharmaceutical industry supported the effort of a private entrepreneur—Derwent Ltd. If a computer registry system is needed, shouldn't industry support its operation through trade association

subsidy or by individual subscription? There are examples of the feasibility of such activities as, e.g., the American Petroleum Institute abstracting service.

If an interested Government agency desires a computer registry system, shouldn't it draw up an RFP, or approach existing private services to modify their procedures to satisfy their particular requirements? During the time that the CA–NSF contract was negotiated the Index Chemicus was approached by the U.S. Army and requested to negotiate a licensing contract for the use of the already extant IC registry. Members of the team who negotiated the CA–NSF contract were aware of this IC proposal. Why then wasn't the institute approached regarding the experimental development and testing of the registry system? Not only does ISI already have half-million molecular formula records on tape, but there is little unique about the CA indexing operation that cannot be performed by others. Indeed, the fact is that even under the terms of the contract, CA's registry indexing will be several months behind the indexing done at Index Chemicus.

ELIMINATE PREFERENTIAL DISCOUNTS

Should Government make grants or contracts with any organization, ACS or otherwise, which gives special preferential discounts to its members on services aided or subsidized by those grants? This is not a blanket condemnation of such organizations, but there is a great difference between the special privileges granted ACS members and those of an organization like AAAS. Membership in AAAS is open to anyone. The cost of AAAS journals is not significantly different to nonmembers. The incentive to join AAAS is not a high reduction in subscriptions. On the other hand, as a member of the ACS, a substantial saving is involved if one purchases all its publications and indexes at membership rates.

KEY TO REALISTIC UTILITY EVALUATION OF INFORMATION SERVICES

The government should foster plans in which the individual scientist allocates realistic sums for science information services. All of the existing government publications should be made to establish subscription prices which reflect their true costs. If artifically low prices of these publications are needed as indirect aid to foreign and domestic institutions which cannot afford them, let the proper agencies support them as, for example, AID or the State Department. Only realistic pricing of information services can allow a shakedown evaluation by the scientific community fairly based on value received per dollar spent. Furthermore, such policies would ultimately force the various abstracting services to curtail unnecessary duplication (6).

NATIONAL INFORMATION SYSTEM

The following organizations satisfy, or have the potential for, national information systems:

	Approximate coverage per year
1. Institute for Scientific Information	300,000
2. Chemical abstracts	200,000
3. National Library of Medicine	150,000
4. Biological abstracts	125,000
5. Department of Agriculture	100,000
6. Federal Clearinghouse	50,000
7. Engineering Index	40,000

DDC, or any other group heavily oriented toward classified documents is not listed since the Federal Clearinghouse covers, or will cover, material emanating from NASA, AEC, and DOD. The systems are ranked by the number of new documents each processes per year. The Library of Congress has been omitted. At the present time it does not provide any significant large-scale science information coverage of nonbook material.

The multidisciplinary scope of ISI activity is paralleled by that of the Federal Clearinghouse. However, while ISI has covered journals and U.S. Patents, FC has covered primarily government reports. Neither adequately covers the multiauthored book and conference literature mentioned previously. However, both systems have the innate capacity to expand so as to cover all types of materials, and also an even broader range of information than at present. ISI's coverage of 300,0000 documents could be usefully expanded to 400,000 or 500,000

journal articles in the near future and gradually expand as the world total of research increases.

It should be evident that ISI is clearly staking a claim as the first comprehensive national information system. We hope that the government will share in the realization of this concept by adopting various recommendations made here. Any private company can, if it wishes, enter into competition with ISI by making a comparable investment—an amount which is easily within the resources of several large publishing firms. Even with broad government subsidy, ISI would not attain a monopoly position.

ISI has been successful in finding low-cost methods of tackling the information problem on a broad front. Furthermore, we are fully willing and prepared to license our data books, etc., to other firms.

As the primary consumer of scientific information, the individual should make the decision on which services he shall use. He can only do this if funds are made available to him directly for this purpose. There are no clearcut directions from government granting agencies on the purchase of information services by grantees and contractors. They are badly needed. The government is spending close to $17 billion per year for research and development. If 1 percent of this money were made directly available for science information services, about $150 million would immediately be available for purchase of commercially available information services. Such large information purchasing power would give private investment sources the needed incentive to develop new and competitive services to meet the needs of research scientists. Individual services would stand or fall not because they have always existed or because they are priced at artifically low prices, but because they meet a recognized need at a competitive price.

However, 1 percent of a research budget for science information facilities is only a fraction of that needed. Under present conditions, 10 percent is easily justified and, in the future, the percentage will rise. However, any direct allocation is a good start as it will serve to educate the scientific and technical community as to the real value of science information services. Initially, direct stipends—(7)—to scientists for science information services over a 5-year period is a course that has been recommended.

In addition, government agencies must be encouraged to make greater use of commercially available services and discouraged from building up overlapping in-house capabilities when they are not clearly economically justifiable.

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3. "Chemical Literature Expands," "Chemical and Engineering News," 44 (23), 84–88 (1966).

4. A. M. Weinberg, et al., "President's Science Advisory Committee," in "Science, Government, and Information"—Responsibilities of the Technical Community in the Transfer of Information"—(Washington, D.C.: Government Printing Office, 1963), p. 14.

5. M. M. Cummings, "Private Communications," October 27 and November 23, 1964.

6. E. Garfield and I. H. Sher, "Article-by-Article Coverage of Selected Abstracting Services" (*Philadelphia. Institute for Scientific Information*, 1964), 18+ pp. [Final Report to the National Science Foundation under Contract NSF C–332.]

7. E. Garfield, "Copyright, Contents Pages, Cooperation, Conscience * * * necessary ingredients for the effective dissemination of scientific information," "The Percolator" 35(1), 19–23 (1959). Reported in "Chemical and Engineering News" 37(19), 85 (1959); See also E. Garfield, "Abstracting and Problems of Copyright—The Relationship of Copyright, Communications, and Profit Motive" in "Reprography and Copyright Law," 1964, pp. 112–118, American Institute of Biological Sciences, Washington.

[Draft, May 31, 1972]

A BILL TO ESTABLISH A NATIONAL INFORMATION FUNDING AUTHORITY

The purpose of this bill is to insure that American biomedical and health-related research scientists utilize the unique information resources available from government, professional, and private sources. It is generally recognized amongst these scientists that a major deterrent to the accomplishment of significant advances in cancer, heart, and all other types of research has become the information explosion.

Information in all branches of science have significant implications in these fields but individual scientists find it increasingly difficult to be aware of and utilize these advances. The reasons are various but include especially the lack of specific funding for modern information systems utilization as well as supporting scientific information personnel. Use of paramedical scientists in the immediate application of known methods of handling scientific information can have an enormous impact on this country's multibillion dollar and biomedical and health-related research programs. The latter includes environmental research of all kinds, behavioral and social research, safety, et cetera.

Under this bill there would be no single centralized information service agency established. On the contrary, all funds would be channeled directly to the consumers of the needed service so that each one can choose from the variety of commercially available information services. This funding would be accomplished by direct stipends allocated to scientists using one or more simple criteria such as size of research grant, number of scientists to be served, et cetera. The formula for these stipends would be established by an advisory board to be appointed by the President and will include representatives from the information industry, science information community, and the professional societies, as well as NIH, NSF, and major government agencies—in particular those who provide grant support to scientists.

The need to provide training for information specialists in the health fields is badly needed. The advisory board of the NIFA will determine what funding NSF and NIH are providing in the training of scientists in the use of modern methods. Where existing NSF, NIH, and other educational funding falls short, the NIFA should provide funds for such training. Training would be especially encouraged at universities or in private institutions, including various short courses or seminars. Stress should be placed on training existing faculty to assume the permanent role that is needed in an information conscious society.

The Authority should not support research on information systems as this is the basic function of NSF, NIH, et cetera. The Authority should have the singular objective of increasing the efficiency of research by utilization of vast existing and forthcoming information resources, both foreign and domestic.

Information services may take a variety of forms, including printed indexes and abstracts, magnetic tapes, microfilms of all kinds, et cetera. Where many of these have traditionally been purchasd through overhead allocations for libraries, the traditional centralized library can no longer cope with the immensity of the problems faced by individual scientists and science administrators. Each individual institution must determine its own centralized needs, but only direct line allocation of funds for information services can insure their proper and adequate utilization. Information services can no longer be regarded simply as an overhead item. It should be the direct responsibility of the user to specify and pay for his own information needs.

There may be instances where scientists will turn over their information stipends to local library authorities. However, this should release other local funds for improvement of centralized facilities. Indeed, the Authority shall encourage grantees, where appropriate, to pool their stipends to acquire information services that would otherwise be out of reach of individual budgets—much the same as would be the case for expensive or complex scientific instruments.

However, the emphasis shall always be on utilization of information resources in furtherance of the specific programs of the individual research grantee.

Grantees eligible under the Authority's stipend program shall not be limited to government-support grantees but shall include any research workers obtaining support through private philanthropy, industry, et cetera. However, in the case of such nongovernment support, only those willing to make full disclosure of the nature and extent of their research shall be eligible.

Where appropriate, the Authority will encourage application for stipends through professional societies acting to facilitate communication for their mem-

bers. However, only individuals engaged in research may qualify for a stipend. The Authority can establish granting review boards to determine eligibility. Stipends should not be denied to individual researchers unaffiliated with academic or other institutions who are prepared to disclose the nature of their research programs.

The effect of this program would be to encourage appropriate innovation in the new field of information technology but leave the ultimate choice of service to the consumer. Each existing or new service should compete fairly for the information stipends provided to grantees in this program.

In order to encourage the widest possible competition amongst information industry firms the Authority should not permit funds to be used for the purchase of information services which are subsidized directly by governmental funds or by tax exemptions. To do so would be to ask taxpayers to pay twice for such subsidies and to discourage private investment in the information industry.

Furthermore, the NIFA shall thoroughly investigate information services sold abroad which are priced below those of American services through government grants. U.S. information firms should be expected to compete with foreign information services but not when such services have subsidies from government or other sources other than the subscribers themselves.

The NIFA shall deny funds for the use of services which are in violation of U.S. copyright laws. Thus, grantees will be encouraged to use funds for purchase of reprints, photocopies, or printed documents, but only when compliance with existing newly established copyright laws are honored.

The Board of the NIFA shall keep in mind that the Authority is not established to provide permanent subsidies to individuals but rather to encourage the use of the new information media to improve the efficency of American R. & D., education, et cetera. Ordinarily 3 to 5 years should be considered the maximum time for such subsidization—by which time line items in grantee budgets should be allocated as for any other research related activities.

It should not be the purpose of NIFA to fund, e.g., purchase of indexing services that have been purchased regularly by centralized library facilities during the period prior to application for funds.

Mr. ZURKOWSKI. In conclusion, we would like to direct your attention to page 11 of the statement, under the title, "Recommendations." It is clear from our examples, or it should be, that there are a lot of applications for advanced information technology, but it is not necessary that the government spend its own money to get the job done, in many cases.

Two areas of possible congressional action come to mind. The first involves the Office of Management and Budget's Circular A–76, a copy of which is attached, and the second involves the Freedom of Information Act and the work of this committee in that area.

With regard to A–76, it is our reading that the standards established in the circular, and you may want to review this for yourself, for deciding whether a particular government activity should be performed in-house or on the outside does not apply to products created for distribution to the public by the government. Furthermore, while the procurement Commission considered various aspects of this circular, the Commission report fails to deal with the kind of information technology applications that concern this committee and our industry.

The Freedom of Information Act and amendments currently under consideration are of great interest to us. Congressional efforts to obtain fulfillment of the spirit of the act are well directed. We would like to recommend to this committee, whether it be in the form of proposed revisions to the OMB circular, or in the form of a committee survey of agency practices, or in legislation implementing the Freedom of Information Act, that a positive action plan be required of all agencies with regard to the information they produce. Such a positive action plan would require agencies to go beyond simply providing Government

information on request; it would require agencies to come up with a positive action plan for calling to the attention of interested citizens the information generated by the agencies specifically affecting them, whether as a benefit or a detriment. Agencies should take positive steps to make known to the public what is available and to make it physically and easily accessible to them.

The dissemination or publishing of such information will, as I believe we have demonstrated, involve considerable capital investment. We recommend to the committee that each agency, prior to submitting the positive action plan and a supporting plan for carrying it into operation, be required to demonstrate that it has explored every avenue possible to obtain the required dissemination through existing commercial channels, without the investment of large amounts of tax revenues. We would add we feel this should apply to the GPO and other legislative agencies as well as to executive departments.

In conclusion, we feel that we come at these hearings, from a fairly specific direction, with some fairly specific ideas. We share the committee's concern that the decisions made about the development and use of these technologies should be well thought through. We are, through the process of these hearings, moving the industry toward a fuller recognition of its opportunities and responsibilities to work with the Government in these areas. This is an invaluable opportunity for us as an industry, and we hope through the process you have come to some appreciation of our capabilities and willingness to work with you toward the optimal use of the technologies involved.

Mr. MOORHEAD. Thank you very much.

Mr. ZURKOWSKI. We almost hit the bell.

Mr. MOORHEAD. Thank you very much, Mr. Zurkowski, and your colleagues. We appreciate very much this material you have submitted. It is really quite a tome of information itself, which we will study. Would you gentlemen be willing—I do not want to embarrass anybody, but I would be interested in the cost to subscribers. Are you willing to talk about that?

Mr. ADLER. No problem.

Dr. GARFIELD. For example, consider the case of the services described as "Current Contents," copies of which were handed out to the committee.

Mr. PHILLIPS. Yes, they are in our folders.

Dr. GARFIELD. These are pocket-size publications that go out weekly. A typical service of this kind would be about $100 a year. Educational discounts are provided. Basically, the service costs about $2 to $3 per week. In addition, we provide a computerized alerting service, called "Automatic Subject Citation Alert". For ASCA, each user defines his own particular profile of interests. Then he receives a weekly computer report listing all of those publications in his specific field of interest. That would cost about $3 a week.

There is a document procurement service, which we call "Original Article Tear Sheets." Each document or tear sheet costs about $2.50. Users can also obtain this information from other local libraries, if they have them. As a matter of fact, many libraries use our data service as a backup to their own collection.

To give you some idea of the scope of ISI's activities—in 1974 it will have a turnover in excess of $8 million.

Mr. MOORHEAD. Which would indicate how many subscribers?

Dr. GARFIELD. Individual subscriptions would probably be on the order of 25,000, but readers would be about 10 times that. Social Sciences Citation Index would cost $1,250 a year. There is a grant rate for developing countries, smaller colleges, and so forth.

The Science Citation Index is $2,500 a year. That index, if you can imagine it, is published each year. It is about 10 times the size of the New York telephone book, and each year's index is different. A 5-year cumulative is about 30 times the Washington phone book.

Mr. PHILLIPS. Are some of your subscribers Government agencies?

Dr. GARFIELD. By all means.

Mr. PHILLIPS. So that there is a feedback of what other agencies might be doing in the same field, as well as the agency affected, and your subscribers?

Dr. GARFIELD. Exactly. I might add that about 40 percent of our business is foreign. The information industry has a very significant impact on the balance of payments.

Mr. ADLER. Mr. Chairman, I wonder if I could add one point to what Dr. Garfield said. In our business, you have to distinguish between the subscriber and the user. Much of what we issue is sold for use in libraries. The library pays its share of the cost of producing the product, and then makes it available, usually at no further charge, to the users of the library.

Dr. GARFIELD. With the advent of online retrieval services, we are going to see a gradual change in this. For example, our ISI data base and a number of other data bases in the information industry, are now available "online" through computer networks. The individual user pays for access to that information bank each time he uses it. However, in the case of the New York Times data bank, institutional subscribers pay $5,000 to $10,000 a year. The actual individual user does not pay but may be charged for the use in his own organization.

Mr. ZURKOWSKI. Could I get at some of the economics, just briefly, partciularly vis-a-vis the Government producing the same product?

We had a discussion about this at breakfast, and the other members of the panel here think that my cost estimates are low, and perhaps they are. But, of the dollar a customer pays for an information product, about one-third of it goes to producing the product; a third to one-half goes into the education and marketing effort, and the remainder goes to retire the capital investment and to pay taxes. So that if a product is generating $1 million in sales, you can figure that it costs between $300,000 and $350,000 to produce; so that, if that becomes available to a Government agency for $3,000, you are talking about the agency spending 1 percent of the cost of what it would cost to produce itself. And that is the cost effectiveness that this industry offers the Government in the application of these technologies. It enables the other users throughout the country to help support the dissemination of information which is the function that this committee is particularly concerned with.

Mr. MOORHEAD. I understand that point, which is repeated. But Dr. Garfield has said something about national information funding. Do you have a different concept than does Mr. Zurkowski?

Dr. GARFIELD. Consider the case of research scientists as potential buyers of information service. While Congress appropriates money

for biomedical and other research, it does not specifically allocate money for the use of information. Therefore, the use of information services, commercial or otherwise, is hit and miss. The average scientist is not adequately educated to spending money for these information services. Although we have made a good start, we have only scratched the surface of what can be done. Generally speaking, we all grew up in an era of free public libraries. We are used to getting information for nothing. When an information supplier tells a user he has to pay $100 a year for a service which, at first glance, looks similar to the Reader's Digest, it is difficult for that user to realize what the true cost of providing such service is. So what I am suggesting is that you must prime the pump on the use of these services. We must get people educated to the idea that they must pay for information services, particularly those that do not have any advertising support. After several years of such pump priming, users would then have to fund these purchases out of their own particular budgets. Incidentally, the March 1974 issue of Atlantic Monthly has an important article on the effects of advertising on newspaper and magazine funding.

Mr. ZURKOWSKI. Could I add an example that was relevant to the Congress? When I worked on the Hill, if the boss called over and said, "get me some information", and if it was not gotten, the next time an appropriation call came up to add to staff, he voted for increased staff. And I think there is tremendous underutilization within the Congress of the available commercial resources, commercial information services, and that is largely because the Congress does not constitute a market. There is no funding mechanism within the makeup of the Congress to enable a Congressman to buy the Index or anything else. He would have to do it out of his stationary account. He does not have anything comparable to an information fund, and I think that if the Congress gave itself an allotment of say $1,000 a year per Congressman, for example, to be available to purchase information services, that you would be amazed how many of these entrepreneurs would figure out ways to help you solve your information headaches.

Dr. GARFIELD. In fact, for your information, the answer to your question to Dr. Branscomb is that we have an IIA member who provides this service.

Mr. ZURKOWSKI. This week's issue (January 26) of Business Week includes a description of one such company—Mead Data Central. In addition, the Aspen system described in the attached addenda also operates in that area.

Another company that is described in Business Week as an information company is Real Estate Directories, Inc., in Miami, which photographs and maintains detailed data on real estate development around the country. And that data base, I expect, can be utilized to complement census efforts and other Government activities. I ask that pages 36 and 37 of the January 26, 1974, issue of Business Week be included in the record.

Mr. MOORHEAD. Without objection, so ordered.

[The information referred to follows:]

PUTTING LAW LIBRARIES INTO THE COMPUTER

Like scientists and other professionals, lawyers stay neck deep in their own paperwork. There are more than 2 million reported court decisions in the United States and they increase by some 30,000 each year. Legislative enactments and

administrative regulations and rulings also number in the millions, and increase even more rapidly than judicial cases. Though a solo practitioner with a quick wit and a form book might brazen his way through professional life—and some do—most lawyers must have access to this ever-increasing quantity of legal materials. As a result, legal research has become a costly, time-consuming, and haphazard process, as wearing on the lawyer as it is draining on the client's pocketbook.

Now Mead Data Central, Inc. (MDC), a subsidiary of Mead Corp., has become the first to do commercially what lawyers have talked about for years—ending the drudgery of research by computerizing "the law."

MDC offers subscribers, which include many prominent New York and Ohio law firms and the Big Eight accounting firms, instantaneous retrieval of the full text of a widening range of legal materials. These include New York and Ohio statutes and decisions of their appellate courts; the Internal Revenue Code, Treasury tax regulations, and related tax materials; and all Supreme Court decisions. MDC plans to complete the process of storing the United States Code and all Federal court of appeals and district court decisions by May. Also scheduled for inclusion in the memory of MDC's IBM 370–155 this spring was Securities and Exchange Commission and Federal Trade Commission rulings and regulations.

UNLIMITED SCOPE

MDC's computer service, dubbed Lexis, permits the lawyer to search for relevant regulations and cases by typing, in English, any words or phrases desired on a special keyboard attached to the user's terminal. The lawyer may ask Lexis to display a simple listing of all statutory provisions and court decisions that contain those words, or at the touch of a button may view portions or all of the actual text on the console's screen. At the touch of another button, a typed printout of any selection will be delivered in seconds. Because the user is not tied to any preselected index, the system is as flexible as the user's mind. Any search request can be instantly modified to expand, narrow, or change the scope of the inquiry. With a few hours' training, the user can learn, in effect, to talk with his own library.

MDC charges lawyers $85 per hour for the computer time. That, according to Jerome S. Rubin, MDC's president and himself a lawyer, is much less than the cost of conventional research because of the speed involved. In one test, a partner in a law firm collected the documents relevant to a tax problem in 3 minutes and 37 seconds through Lexis, while his associate, through conventional methods in the firm's library, required 75 minutes to do the job.

To cope with the flood of decisions needed to keep Lexis current, MDC is working at developing direct ties to the courts. In Missouri, secretaries of the supreme court justices use tape-producing typewriters to prepare decisions. The justices get the typed version and Lexis gets the tape, which is used for direct computer input. The New York Court of Appeals gives Lexis copies of its corrected page proofs, which are then fed into the system a few days after the official advance sheets are published.

WIDER SERVICE

MDC has workers in Korea, Taiwan, and India preparing the immense mass of already published material for storage in the computer. All processing of current cases and regulations is done in the United States. MDC believes it can reduce this processing time through optical character recognition, and Rubin sees the development of such equipment "sooner than the next couple of years."

The prime market for the Lexis system, according to Rubin, are lawyers and accountants in Washington, D.C., and eight States: California, Illinois, Massachusetts, Missouri, New York, Ohio, Pennsylvania, and Texas. Rubin hopes to have "some presence" in each of them by yearend, and he sees an additional seven States in which Lexis could be offered thereafter. Although it will be years before Lexis will contain the laws of most States, Rubin believes large law firms practicing Federal law in any State could use Lexis. "We will offer Federal law in all 50 States before offering State law in each of the States," he says.

MDC has also inaugurated a "parallel program" in accounting, undertaken at the request of the American Institute of Certified Public Accountants. MDC has added AICPA rulings to its library, and these are now available to subscribers for a surcharge.

Electronic retrieval of law dates back to experiments at the University of Pittsburgh's Health Law Center in 1956. An outgrowth is Aspen Systems Corp., now an affiliate of American Can Co., which operates a computerized full-text service for government agencies and private companies in the area of health law.

But the user of this service must mail or telephone his request and must rely on Aspen staff members to conduct the search. Other computer systems have been developed—including the Air Force LITE (legal information through electronics) program and QUIC/LAW at Queen's University in Ontario—but none are as comprehensive or as advanced as Lexis. In 1967, a predecessor company to MDC began negotiating with the Ohio State bar, which since 1964 had been exploring the feasibility of electronic retrieval programs. Lexis was launched in Ohio in 1969. Since that time, MDC has worked closely with bar-related groups in many States to determine what materials should be included in the system.

A Data Service for Developers

Two light planes are crisscrossing the skies of the South on clear days this winter, photographing every square foot of several of its most populous counties. Their airborne spying is far from sinister. They are part of a growing effort to gather definitive information on the country's real estate.

The planes belong to Real Estate Data, Inc., a Miami company that has become the Nation's largest supplier of such data. REDI and a handful of similar, though much smaller, concerns are selling the material to some 25,000 brokers, appraisers, title companies, mortgage lenders, and other real estate professionals who find that it saves them the trouble and expense of making their own maps and searching through scattered public records.

"We are not only helping the real estate market to grow," says Richard A. First, 42, the aggressive founder and president of REDI, "but in many cases we're providing the incentive for additional sales, which I estimate to be in many billions of dollars."

Doing Their Work

His enthusiasm is echoed by some of his customers. "I don't see how we would do without the service," says Darwin Cochrane, chief appraiser for Wells Fargo Bank in San Francisco. "We use it in verifying assessed valuations. If we didn't have it, we'd have to guess at the dimensions of lots and tracts, or go to the county assessors' offices. It saves us a tremendous amount of time." Frank Schlesinger, president of Louis Schlesinger Co., a Clifton, N.J., land-sales concern, says he gave up part of the service, thinking it was too expensive, but found he had to resubscribe. "There are so many ways to use the material," he says. "It's an incentive to explore the area it covers for possible leads in making new sales."

Typically, a REDI data book contains information on a whole county or, if the real estate is highly fragmented, part of a county. Aerial photo maps show the location and size of parcels of real estate, and accompanying text gives the name and address of the owner, the price he paid (worked out from the tax stamps), the mortgage terms, the tax assessment, and any other publicly recorded information.

To gather and collate such data, REDI employs 320 people in offices, laboratories, and warehouses in Florida, Georgia, New Jersey, New York, and California. Its two planes, a Cherokee and an Aztec, roam the country photographing 150,000 sq. mi. a year, while crews on the ground travel 50,000 mi. annually to microfilm public real estate records. In all, First reckons that REDI has details on some 33-million parcels of real estate. Last year, the company sold 163,000 data books to about 20,000 clients.

Spotting a Need

It has taken First 15 years to build REDI to its present size. A high school dropout, he was a successful builders' supplies salesman when he decided he wanted to go into business for himself. He came up with the idea of building apartments but ran into trouble when he tried to locate suitable sites. "I called on one broker after another," he says, "but none of them could tell me where they were or what the price would be. That's when I thought of providing proper real estate information."

Since its fledging beginning in Dade County, which includes Miami, the company has grown out of all recognition. By 1966, sales reached $1.3 million. Last year, REDI netted $632,000 on sales of $5.7 million, and this year First predicts the company will earn $800,000 on revenues of $7 million.

TIE WITH ARCATA

In the interim, REDI has gone public and been in and out of a merger. To raise capital for expansion, First sold 100,000 shares at $6 each in 1968, and the following year agreed to merge with Arcata National Corp., a Menlo Park (Calif.) company engaged in printing, information services, and lumber processing. Arcata ran into financial and management difficulties, however, and last year First asked them to divest themselves of REDI. Arcata still owns 57 percent of REDI but has agreed to sell its remaining shares over the next 3 years if the price reaches $15 a share (it is now around $8). J. Frank Leach, recently appointed president and chief executive officer of Arcata, says that the decision to divest had nothing to do with REDI's capabilities. "It's just that it didn't have a sufficient relationship to what we're doing and intend to do," he says.

With the real estate boom still in full swing, REDI's future looks bright. For one thing, it has few rivals. The biggest is probably Sidwell Co., a mapmaker based in West Chicago, which operates three planes and covers seven Midwestern States. "Most of our work is tax mapping for municipalities, counties, States, and so on," says James Lyons, the company's business development manager.

In Texas, Phil Wilson, a Houston trade publisher, operates one plane and produces a monthly information service covering real estate in Harris County, which contains Houston, and Nueces County, which includes Corpus Christi. Wilson says he has "several hundred" customers who pay $27.50 a month for the service, which he updates with a weekly report.

SELECTIVE DATA

By contrast, REDI's customers pay from $200 to $1,500 a year, depending on what they buy. They can select data from cities and counties in 32 States, including Hawaii, all of which are regularly updated as parcels change owners, values, and other characteristics. About 20 to 25 counties are added each year as real estate activity in an area picks up.

First believes that the basic business will continue to grow, but he thinks that the real potential is in so-called customized service for the bigger realty companies, banks, and savings and loan associations. Using computer terminals hooked up to their home offices, REDI would feed these companies with information tailored to their specific needs. He thinks 10 percent of his customers could use such a service right now. "Some of them have told us a customized package could save them $40,000 to $50,000 a year," he says.

Mr. ZURKOWSKI. But the Government needs to be aware of the burgeoning commercial information activities, and that is the basic purpose of our recommendation to require the agencies, before they start doing something, to explore what already is available. In many cases they will find that it exists and is much more cost-effective to acquire than to reproduce.

I do not think the rest of you explained what your price schedule was in response to the Congressman.

Mr. CARVEY. Our prices are contained in our contract for the SEC. It is fairly complicated because of the various cuts that can be made. But a subscriber receiving an annual report of IBM or Computest Corp., which I have here, pays—and it is a very broad average—about a penny a page for this information. Demand users who buy paper copies of financial reports pay approximately 12 cents a page. We also have an overnight service where, if we have microfiche master in our file—and we have approximately 100,000 of those in our file for this past calendar year (1973)—a user can call in to us and for $7.50 we would mail a copy of that SEC filing the very next day.

Many, many people are perfectly willing to spend $54 to fly from New York City down to Washington and back to obtain a report, so there is a great economy there.

Mr. MOORHEAD. How about you?

Mr. ADLER. The CIS/Index, which consists of 12 monthlies, four quarterlies, and the annual bound volume set, has a basic price of slightly under $500 per year. At the suggestion of the people at the American Library Association, we have established a sliding scale which slides downwards and permits smaller libraries to buy this service for less than $200 per year. Government libraries pay about $350 per year. The microfiche service for a full year is approximately $3,000 per year, which is about $1 per document, and we offer various subunits at varying prices, depending upon the size of the subunits.

The American Statistics Index is similarly priced, but a bit higher, because the body of data we are dealing with is a bit more voluminous.

Mr. MOORHEAD. How about Mr. Fain?

Mr. FAIN. Our situation as a new company is somewhat unique. We have to face the dilemmas of anybody going into business, how to price the product, especially when you are dealing with a very small market. Although ours is a very important market, it is a very small one.

To differ with Paul Zurkowski's economics on this industry, it costs us more to produce our product that we bring in. We are still new and still operating on invested capital. We take different cuts at the information, as Mr. Adler does. In other words, we sell our total service with messenger delivery to some downtown Washington clients. General Motors is a good example. We bring them the Daily Index and Guide with the Congressional Record by 10 a.m. every morning. For that they pay a basic charge of $855 per year.

On the other hand, Members of Congress need no delivery of the Record, they are aggregated in the same building, and we can approach them easily in marketing. We can deliver an Index to them by messenger for $285 a year. You can see the range.

The daily reviews by subject matter (Energy, Environment, Education) run roughly $1.50 per day per subscriber. We can also develop specialized services. I am on my way to the State Department this morning to discuss the idea of them taking a daily foreign affairs review of congressional proceedings. Every desk officer who has one particular country interest will be able to receive a copy on his desk each morning. He can then look up Ethiopia or whatever in the Record; find out what is at play, and, if nothing is at play, shelve the Record and get on with his other business. With all due respect to you gentlemen, a desk officer probably does not need to spend the day following Congress; he needs to spend his day following Ethiopia. But as you all know, he has an interest in knowing what is happening up here on the Hill. Now, under these group arrangements, we come out with special prices. We can supply every desk officer in the State Department plus every major executive in the State Department, with a daily review on foreign affairs for a total of $15,000 a year. This will cost less than one GS–10's salary, and one person could never complete what we can by 9 a.m. each morning.

We feel we offer a very economical range of information products. We approach the market as a small business with a flexible price

schedule; seeking to design the specifications and the price to the customer's situation.

Mr. MOORHEAD. You, Mr. Fain and Mr. Adler, would be going after the same type of customers, I would presume, because to have a complete picture of Congress you would have to have both services, would you not?

Mr. ADLER. I do not think that is entirely true, Mr. Chairman. The people who tend to buy Mr. Fain's service are people who are interested in what happened in Congress yesterday and what is going to happen tomorrow. Our services are based on the published, printed records of Congress that, as you know, may not be issued until weeks or months after the hearing has taken place, and our users tend to be people who are doing more intensive research, perhaps subject-oriented research, and we tend to be used more heavily by scholars and less heavily by lobbyists.

Mr. MOORHEAD. Mr. Phillips?

Mr. PHILLIPS. I think this is an extremely valuable part of these hearings, Mr. Chairman, because it relates an area to our overall subject area that we had not really considered before. I think also it is important because it ties in so closely with the proposed amendment to the Freedom of Information Act that this subcommittee has been working on during the past year and which we hope to vote on later in the week. That is, of course, the requirement to be added that agencies publish an index of policy statements, opinions, and other such material and also to distribute it by sale or otherwise to the public.

I would think that the services that are available through these commercial enterprises would make it much easier for Federal agencies to meet that requirement under our amendment, if it is enacted, and added to the Freedom of Information Act. I would see no useful purpose, for example, for SEC to duplicate such indexing since, under their contract with Leasco, this service is already being done and being done efficiently on a regular basis, and has been for a number of years. And I am sure there are many other agencies where this same thing is true, so that the objections that many agencies have voiced to this particular amendment on the grounds that it would cost them fantastic amounts of money and manpower, I think we have seen, after this morning's testimony, perhaps would not be so difficult after all, because in many cases it is being done by private industry and is available to the public already.

Of course, we do have to deal to some extent with the question of availability. But many of these publications are available through libraries on a subscription basis throughout the country and the public has access to these libraries. In fact, it might be much easier for an individual to make a request for certain information under the Freedom of Information Act using such indexes, so that he would not have to go through regional offices or to an agency in Washington to request it. He could determine the precise way to define the information he is seeking by using the published agency index.

With these kinds of services available throughout the country in libraries, I would think that not only would this make the Freedom of Information Act much more workable, but it would also make it more difficult for Government agencies to withhold information from the public on the grounds that the request does not properly identify it.

We all know many cases like that. And certainly, if there is an indexed reference in one of these publications that we have been discussing, it would be—particularly when that same publication is available to the agency—it would be very difficult for them to arbitrarily deny the request. So I think that this part of our hearings has served a very useful and dual purpose, not only adding greatly to our whole examination of advanced information technology, but also providing additional ways in which the Freedom of Information Act can be a lot more effective and used to a greater extent than it has been used by the individual citizens in the past.

I want to express my own appreciation to all of these gentlemen for their contribution this morning. I think it is very valuable.

Doctor?

Dr. GARFIELD. Mr. Phillips, I particularly want to direct your attention to the document you have received concerning the "Role of Government, Professional Groups, and Private Enterprise in Science Communication." This document was originally prepared for the Scientific and Technical Communications Committee of the National Academy of Sciences in 1966.

The history of government involvement in indexing activities tells us that whenever Congress has given this mandate to Government agencies, the public rarely benefits. Even if it is competent in other respects, it fails in the educational or marketing requirement.

Congress has not wanted Government agencies to promote themselves. They are properly concerned lest Government agencies use advertising to maintain or exceed their power. Therefore, if indexing, abstracting, et cetera, is performed and financed by a competitive information industry in response to user needs, the public gets better service at lower cost. Government agencies will rise and fall. Their ability to deliver an information product consistently waxes and wanes according to the fiscal budget, personnel shifts, et cetera. The history of medical indexing in the United States illustrates the point all too well. The same can be said for agriculture.

Mr. PHILLIPS. Of course, these indexing provisions would not apply to every single piece of paper produced by a Government agency, but only certain categories specified in the FOI Act. But I am suspecting that, from this description, many of the types of documents and information that are contained in the index will even go beyond what our indexing requirements will provide for. So there will be that incremental benefit.

Mr. MOORHEAD. Mr. Daniels.

Mr. DANIELS. No questions, thank you.

Mr. MOORHEAD. Can you, Mr. Fain, retrieve parliamentary rulings from your study of the Congressional Record?

Mr. FAIN. I would have to check with our editor who handles the thesaurus and computer. I believe not. I do not think we take those.

Mr. MOORHEAD. Mr. Cornish.

Mr. CORNISH. I have only one thing to say, Mr. Chairman. I think we ought to immediately order all of these services and publications.

Mr. PHILLIPS. That would be very useful.

Mr. MOORHEAD. We have very good salesmen before us today, in addition to being excellent witnesses.

Thank you very much, all of you. The panel has been most helpful, and we appreciate your taking the time to educate us. Thank you very much.

The hearing is now recessed until 10 a.m., next Thursday in this room.

[Whereupon, at 12:25 p.m., the subcommittee adjourned, to reconvene at 10 a.m., Thursday, January 31, 1974.]