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Volume Title: Annals of Economic and Social Measurement, Volume 1, number 1

Volume Author/Editor: NBER

Volume Publisher: NBER

Volume URL: <http://www.nber.org/books/aesm72-1>

Publication Date: 1972

Chapter Title: Computers and the Communication of Research Information

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Chapter URL: <http://www.nber.org/chapters/c9187>

Chapter pages in book: (p. 94 - 100)

COMPUTERS AND THE COMMUNICATION OF RESEARCH INFORMATION

By N. O. BEHARIE

Researchers are showing an increased concern for the efficiency of existing information systems. The first step towards an improved system involves an inventory of information on existing communication networks and on the requirements of the profession. Accordingly, a Workshop on Communication in Economic and Social Research: The Media and Computer Technology, was held on June 4, 1971 at the Urban Institute in Washington, D.C., under the sponsorship of the National Bureau of Economic Research. This workshop was the third held by the NBER's Conference on The Computer in Economic and Social Research. In keeping with the exploratory intent of the meeting, the discussions were wide ranging. The deficiencies of the present system were reviewed and several approaches to an improved system were proposed. What follows is one person's view of the proceedings and should not be taken as an "official" report. The full program is listed at the end of this summary.

PROBLEMS WITH THE PRESENT SYSTEM

In their respective papers presented at the Workshop on Computers and Communication (see Program at the end of this note), Richard and Nancy Ruggles and Mark and Naomi Perlman summarized the historical development of the present communications network in economics and discussed the compilation and production of bibliographies, indexes and abstracts. Out of these discussions it became clear that with the rapid growth in the number of economists and consequently in the demand for journal space, there has been a decline in the acceptance rate of articles, even though journals have been increasing in size. This implies a growing pool of unpublished papers; although some of these are absorbed by conference volumes or working paper collections, they often serve a limited audience. Concomitant with this development is the trend towards increased specialization of economics journals, creating further problems of communication among subgroups within the profession.

Three major deficiencies were identified. The first dealt with the short-run problem of providing prompt information on research in progress which would open up "invisible colleges" to a wider audience. The importance of contact with other researchers during the early phase of a research undertaking was stressed by Bonomo, who has submitted a proposal to NSF to establish a Clearinghouse for Research Papers in Economics. Such a service could either be operated independently or be part of a larger, more general system. In either case, it would reduce the lag between completion of research and dissemination of results for articles that would ultimately be published, and would expose other research that would not be published at all, to a wider audience.

The second problem involved retrospective information retrieval. Bibliographies, indexes, abstracts and announcements, which have been the traditional routes to the literature, are still indispensable, but there is much scope for consolidation to reduce duplication; in particular, the creation of computerized master files would improve speed and ease of access to these data bases.

The third issue dealt with the over-all dissemination of economic knowledge. Several questions were raised: Should a strict refereeing system be instituted to sort out essential information from the "paper explosion?" If so, how can we guard against the suppression of novel or unorthodox ideas? Another approach noted by Borts, involves a system of unrefereed papers; while this eliminates the exclusion which characterizes the present system, it would also open up the possibility of flooding communications channels with low quality papers.

A COMPUTERIZED NATIONAL INFORMATION CENTER FOR ECONOMISTS

Throughout all the discussions, one thing stood out very clearly to this observer. The present system of information dissemination is piecemeal, uncoordinated and duplicative. Given the vast storage capacity of computerized files and their potential for access on an interactive basis, some coordinating organization such as a National Information Center for Economics seems necessary. Such organizations have already been established in other disciplines and the relevance of their experiences was discussed by Harold King, Fred Abel, and Morton Malin. The consensus was that while valuable lessons can no doubt be learned from Physics, Chemistry and other disciplines the special characteristics of the economics profession must be taken into account. These characteristics include the relative importance of books as opposed to articles, average length of articles, urgency of timely publication, and the role of non-experimental data in research.

Conceivably, an Information Center could be constructed from scratch, with all the desirable features built into it from the start, or the desired system could be gradually approached by piecing together existing, isolated structures and procedures. In the view of the Ruggleses, the latter would be the most practicable approach, although the design of such a system still involves problems of compatibility. They noted that much work has already been done on both the *content* and the *procedures* that would characterize the desired system. Here, *content* refers to bibliographies, indexes, abstracts, and other items which provide information on the literature. Procedures refer to methods of access: the experiences of five associations with one system was summarized by the Ruggleses: System of Information Processing for Professional Societies (SIPPS). After reviewing the experiences of these associations, the authors conclude that "The concept of a single master file divided into subfiles has been directly relevant despite the differences in the type of information which is being entered and the uses which are being made of it."

Visions of the system's capability varied from handling mundane administrative chores to playing an essential role in research operations. The Center would be a depository for biographical and bibliographical information; this would in fact, constitute its information base in machine readable form. Three general types of functions were considered:

A. Administrative-Organizational Services

The first concerns administrative functions that would be facilitated by an improved information system. Several of these were given by Sandmeyer. While he

was referring specifically to the Southern Economic Association, these operations could be more efficiently done by the Center for all associations within the profession; this more general aspect was discussed at some length by Berg and Ruggles. The important procedures that were considered included the following:

1. Making arrangements for conventions, printing programs, and managing convention advertising and exhibit space.
2. Maintenance of membership lists and preparation of bills.
3. Program planning and participant identification by the various associations and research organizations.
4. Computer matching of academic vacancies based on candidates' qualifications and preferences.

B. Literature Retrieval

The second general function of the Center would be to provide on-line transmission of research information. Much discussion centered around the specific form in which the information should be stored and the particular mode of access that would be most flexible and convenient. Malin stressed the ease and convenience of citation indexing. Abel emphasized the need to have several points of access to the files and advocated the use of word descriptors. After summarizing the experience of the AAEA with the American Agricultural Economics Documentation Center (AAEDC), Abel suggested that the Economics profession would benefit from a similar organization in several ways:

1. Computerized literature search and retrieval (retrospective).
2. An early announcement publication by the Center.
3. Selective dissemination of information.
4. A citation index.
5. Periodic review of current literature or state-of-the-art reports by subject specialists.

Along the same lines, the idea of a Central Register was suggested by Ruggles. This would contain public files of highly interrelated sets of information that could be accessed by a remote terminal. "Browsing" would be facilitated by having the information displayed on a CRT device and/or having it printed out on an attached teletype machine.

The Perlman's pointed out that the *Journal of Economic Literature* is now creating machine-readable files as a by-product of the publication process. The *Index to Economic Literature* will be derived from the *JEL* data base by sorting according to authors and classification numbers. Thus, the creation of a Central Register which includes biographical as well as bibliographical information may not be too far in the future.

C. Research on Information Flows

A third function of the Center could be to study the patterns of information flow within the profession. Such studies were referred to by Bonomo for his proposed working paper Clearinghouse, but even more comprehensive research could be done at a National Information Center for Economists. The changing structure of demand for economic information could be studied to provide

feedback to researchers who are the suppliers. This would serve to partly reduce the gap referred to by Ripley between policy questions and research.

Discussions of New Approaches

Most of the above summary relates to specific problems of information dissemination and the potential role of the computer as a "facilitator." Berg addressed himself to the broader questions of the over-all structure of the profession and the organizational forms within it. He suggested consideration of a divisional structure along the lines of the American Chemical Society, with subdivisions having a substantial degree of autonomy. Alternatively, a federation of societies, as in Physics, could be developed; a coordinating secretariat could promote innovation among the Allied Social Science Associations. On a more specific issue, Berg recommended the establishment of a Council of Economics Editors (CEE) which would meet periodically to discuss problems common to the management and publication of journals and to take steps to improve the flow of information.

A concise summary of the needs of the present system, and of the suggestions that were made in response to these needs, was given by Meyer in his overview of the major themes of the papers and statements that were prepared for the workshop. In his view, the major "areas of consensus" revolved around three issues:

1. The need for standardization on the formatting of computer files. This would reduce duplication of programming efforts within economics and provide an interface with other disciplines.
2. Creation of institutions which would facilitate cooperation, especially with regard to innovation, along the lines suggested by Berg, Ruggles and others.
3. Experimentation with different modes of dissemination and with a division of labor between archival and current awareness publications; this would facilitate planning for new communications networks.

It remains to be seen whether this consensus will result in significant institutional change in the near future.

National Bureau of Economic Research

PROGRAM

Workshop on Communication in Economic and Social Research:
The Media and Computer Technology

June 4, 1971, Washington, D.C.

Session 1: The Structure of Information Systems, Chairman: John Meyer, Yale University and NBER

- 1.1 Richard and Nancy Ruggles, Yale University and NBER; "Communications in Economics: The Media and Technology"
- 1.2 Harold King, Urban Institute; "Communications Networks in Other Disciplines"
- 1.3 Discussion of first two papers and "statements" prepared by participants.

Session 2: Dissemination of Bibliographic and Biographical Information.
Chairman: F. Thomas Juster, NBER

- 2.1 Vittorio Bonomo, Virginia Polytechnic Institute: "A Clearinghouse for Research Papers in Economics"
- 2.2 Fred Abel, Economic Research Service, USDA: "An Early Announcement Service in Economics: American Agricultural Economics Documentation Center"
- 2.3 Morton Malin, Institute for Scientific Information: "Citation Indexing and Services for the Selective Dissemination of Information"
- 2.4 Mark and Naomi Perlman, University of Pittsburgh; "*The Journal of Economic Literature*: Indexing, Abstracting, and the Computer"

Session 3: Priorities in Communications—Technological and Systems Development, Chairman: Sanford Berg, NBER

ANNOUNCEMENTS

NBER COMPUTER CENTER FOR ECONOMICS AND MANAGEMENT SCIENCE

The National Bureau of Economic Research has launched a major project to improve the way computers are used in research. This Research Center will serve economics and related fields and will help to generate new computer techniques for a broad class of academic and other non-profit users. A resident staff in the new National Bureau's Cambridge office has been assembled to direct the initial efforts.

The Center has the following four goals: (1) to explore both proven and new areas of quantitative techniques, to determine the basic structure of these techniques and the means of transforming them into computer algorithms and software; (2) to provide a technical environment where researchers can easily create, modify and test new computational techniques; (3) to produce useful software generated from research activities; and (4) to insure the dissemination of software produced at the Center both through educational activities and maintenance procedures.

As conceived by its founders, the Center will permit research work to be done from diverse locations through the relatively new technology of interactive remote processing. The Center should significantly enrich research activity in the fields it covers and, it is hoped, may serve as a prototype for similar centers in other disciplines.

The National Science Foundation has approved in principle a five-year budget plan of \$5.5 million. A two-year NSF grant for \$1.5 million has already been awarded.

The Center will start out as the creation and responsibility of the National Bureau, administered by a Policy and Operations Committee. This Committee, which will function at the outset as a subcommittee of the Bureau's Board of Directors, will be comprised of several Bureau Directors; representatives of the projected user community; and computer scientists. The administrative organization is designed to allow the Center to achieve complete independence from the Bureau within several years, if this should be desirable.

CONFERENCE ON THE CURRENT POPULATION SURVEY

Outside the Decennial Census, the Current Population Survey is the single largest and only continuing source of extensive micro data on the social and economic characteristics of families and individuals in the United States. Historically, for many reasons but chiefly because of an inability to handle the physical volume, these data were not generally available to researchers outside the Bureau, much less outside the Government. With the development of computer technology and the extensive spread of computer availability, however, the Census Bureau has taken steps to make its micro-records more readily available to the community of researchers in order to meet the expanding demand.

As one means of extending awareness of this resource and to provide a forum for a discussion of problems relating to the availability and use of these data, the National Bureau of Economic Research is planning a Conference on the CPS under the chairmanship of James D. Smith of Pennsylvania State University. The place and date have tentatively been set for Pennsylvania State University in September 1972. This will be the second conference of the NBER's Conference on the Computer in Economic and Social Research.

The conference will bring together producers and consumers of CPS data, along with computer scientists-economists, with the purpose of

1. Discussing the conceptual structure, sample design, data collection, and processing procedures utilized in the CPS.
2. Examining the current and prospective uses of CPS micro-data for measuring levels and changes of the social and economic indicators and for modeling and simulation.
3. Exploring alternative methods of data dissemination and the role of the computer in these processes.

Persons desiring more information on this Conference should contact James D. Smith, Department of Economics, 613 Graduate Building, Pennsylvania State University, University Park, Pennsylvania 16802. Tel: (814) 865-6681.