A Perspective on Information Resources

The Program Year in Review 1973-74

Program on Information Technologies and Public Policy

Harvard University Cambridge, Massachusetts

Program Director

Anthony G. Oettinger is Professor of Linguistics and Gordon McKay Professor of Applied Mathematics and a member of the Faculty of Public Administration at Harvard University, where he has also served as chairman of the Committee on the Computing Center and as a Research Associate to the Program on Technology and Society.

He is a member of the CATV Commission of the Commonwealth of Massachusetts and an adviser to the Subcommittee on the Economic and Social Impact of the New Broadcast Media of the Committee for Economic Development. He has served as president of the Association for Computing Machinery (1966-68) and as a consultant to the Office of Science and Technology, Executive Office of the President of the United States (1961-73). He is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and the Institute of Electrical and Electronics Engineers.

As chairman of the Computer Science and Engineering Board of the National Academy of Sciences (1967-73), he led the preparation of NAS reports on *A Technical Analysis of the Common Carrier/User Interconnections Area* (Lewis S. Billig, Project Director), *Databanks in a Free Society: Computers, Record Keeping and Privacy* (Alan F. Westin, Project Director), and on *Libraries and Information Technology — A National System Challenge* (Ronald L. Wigington, Project Director). He is the author of *Automatic Language Translation: Lexical and Technical Aspects*, of *Run, Computer, Run: The Mythology of Educational Innovation*, and of numerous papers on the information technologies and their uses.

Associate Director

John C. LeGates's experience prior to joining the Program has been in the development of educational and medical applications of computing.

At EDUCOM, he was the executive director of the Educational Information Network (EIN) and the author of several articles on computing networking. Earlier, as Vice President of Cambridge Information Systems, Inc., he was director of the technical staff, and responsible for the company's nationwide marketing efforts. He also directed the development of the Massachusetts General Hospital Integrated Information System.

At Computer Advisory Services to Education Inc., he was vice president and director. At Bolt, Beranek and Newman, Inc., he was responsible for exploring the potential of the TELCOMP language in education.

His studies were in mathematics (Harvard) and philosophy (Yale).

A PERSPECTIVE ON INFORMATION RESOURCES

The Program Year in Review 1973-1974

Act as men of thought.
Think as men of action.
—Henri Bergson

Program on Information Technologies and Public Policy
October 1974

Harvard University
Cambridge, Massachusetts

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Southern Railway System
Zenith Radio Corporation

A companion booklet, *The Scope of the Program 1973-1974*, is available on request.

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	$ billions	
Broadcast television	2.8	FCC — regulated
Cable television	0.3	
Broadcast radio	1.1	
Telephone	18.2	
Telegraph	0.4	
Specialized common carriers	0.0	
Satellite carriers	0.1	
Mobile radio systems	1.9	
Motion pictures	3.8	
Organized sports, theatres, etc.	4.4	
Computer software suppliers Computer service suppliers	1.9	
Postal service	6.3	
Private information delivery services	0.7+	
Newspapers; wire services	7.0	
Periodicals (including newsletters)	3.2	
Business consulting services	0.9	
Advertising	7.9	
Marketing	73.9	
Brokerage industries	40.6	
Book publishing and printing	3.4	
Libraries	2.1	
Schooling	70.0	
Research and development	26.6	
Federal information institutions		
Census Bureau	0.1	
National intelligence community	4.0+	
National Technical Information Service	0.0	
Social Security Administration	1.0	
County agents	0.3	
etc.		
Banking and credit	61.1	
Insurance	92.6	
Legal services	8.5	

GNP (1970): 976

Figure 1. The Information Industries
Approximate Gross Revenues (1970)

INTRODUCTION

This booklet reports on the details of the research, teaching, and communications activities of the Program on Information Technologies and Public Policy from September 1973 through September 1974, the second year of its existence. It also gives background information on the Program's structure, operating procedures, administration and finance.

Program Scope and Aim

The intentions and expectations of the Program are best understood through reading a companion booklet subtitled *The Scope of the Program 1973-1974.* For convenience, however, a sketchy introduction to the Program is also given here.

Information is a commodity that pervades all organized activity; its social and economic characteristics are unique and ill-understood. There are dozens of industries and governmental operations in which information is the primary or sole output, and yet there is no comprehensive source of even the most basic facts about the information industries as a group.

A glance at Figure 1 will make the reasons for this lack of information and insight plain. The information "industries" are a diverse group, including the Census Bureau and the Social Security Administration; Hollywood, Madison Avenue, Wall Street and the Pentagon; book publishing and printing, computer software, telegraph, telephone, and satellite carriers. This just begins the list, but it is plain that this is no ordinary field of study.

Alterations in the relations between oil and coal in the energy industries, or between trains, boats and pipelines in the transportation industries clearly have large implications for public policy. It is equally clear that changes in the relations among information industries can have a similar impact on the public. The public has a vital interest in the rapid and fundamental changes occurring in

- how information systems perform
- who controls information flow
- and on what terms that information is made available to users to meet their needs for the knowledge and understanding required to participate fully in our society.

Of central importance is the question of who holds how much power over whom.

Today, major social, economic and technological factors are altering or eliminating the historic barriers between information industries and making new alternatives available to information users. What happens to one information industry strongly affects not only all the others but also the public generally. These relationships have not been widely recognized and little is known about their effects on either the industries or the public. The Program's approach to these basic questions will be found in Figure 2.

It is the aim of the program to develop an understanding of information systems and information technologies and to use that understanding to illuminate public discussions of information policy.

Program Structure and Activities

In working toward that goal, the Program is seeking to develop a coherent framework within which to analyze the diverse issues surrounding the use of information technology. At the same time, it is attempting to specify policy options and their likely effects on the public. Its publications are intended to be objective enough to be useful to all parties in a dispute and intelligible to the general public as well as to scholars. The Program seeks a balance between general funding and project funding, and a multiplicity of private and public sponsorship.

The structure of the Program is relatively simple. Substantive activities fall under three headings: research, communications and teaching, held together by a program core.

The major function of the Program's core activities is to set and sustain the course of the Program. The core program establishes priorities, defines new projects, maintains communications, and fosters coherence and synthesis in analyzing the problems of information policy.

Although they are described in separate sections of this report, the categories of teaching, communications, and research overlap to some degree. The Faculty Seminar, for example, is described under communications, but also plays an essential role in research.

How core and other ongoing activities are financed is detailed in the concluding sections.

The Program's second year was a period of natural growth in all these activities. The number of incipient projects was larger than in the first year, and proposals came in at an increasing rate. More projects went into operation. More projects were completed and results published. More forums for presentation of research results appeared, including requests for testimony from committees of Congress. Working affiliations with the Program by individuals and organizations both inside the University and outside also reflected the increased visibility for the Program.

A major drive for corporate affiliations with the Program was launched with encouraging success.

International interchanges increased. This was not the result of a deliberate effort, but happened naturally. The communication/computer activities of the United States cannot be understood in isolation from the rest of the world.

The Program's Role

This growth in activity and range brought with it a sharper perspective on the Program's proper role. We are trying to strike a balance between the long scholarly view on the one hand and short-run worth on the other. The latter is the province of consultants, and the independence we seek to maintain is not always valued in consultants. The former is the province of long-range planners and academic theoreticians and is often prone to irrelevance. The Program seeks to be independent enough to ask or select its own questions and relevant enough to ask questions whose answers can make a difference.

The Program's time frame is from three to ten years ahead. The problems that will be of pressing importance then are often already problems today, or at least already anticipated as problems of tomorrow.

As for audience, we also seek to strike a reasonable balance. Reports of Program research are expected to draw on the strengths of the scholarly tradition and to meet scholarly standards of rigor and thoroughness, but they are also expected to be useful. To be useful they must be timely, and intelligible to "public policy publics", including concerned citizens, top management, the Congress, the agencies of government, and the like. To this end, the Program's consulting editors work with the researchers to eliminate jargon and unneccessary abstraction, just as the researchers work with the core

What are the implications for information users of jockeying among old and new information organizations for old and new information markets?

What are the likely effects on information users of increasing or decreasing competition among old and new information organizations?

How does the traditional mixture of private enterprises and public agencies serve information users? What would be the likely effects on users of shifting the allocation of any information functions from one industry or agency to another? From the public sector to the private sector or vice versa? From national to international control or vice versa?

How responsive are traditional patterns of governmental and other public intervention in information systems to the needs or demands of information users? What would be the likely effects of extending or curtailing intervention nationally? Internationally? What alternative patterns are available? With what likely effects?

What governs the nature and the rate of technological innovation in information systems; and with what likely effect on information users?

Figure 2. The Program's basic questions

program and with project reviewers to get the facts straight, purge unfair arguments, eliminate sloppy conceptualizations and incorporate missing dimensions.

Program reports attempt to set forth the basic facts and to analyze the forces at play in the decisions under consideration. Where possible, we list policy options and their likely consequences. We then try to get our findings into the hands of the significant actors involved, be they corporations, Congressional committees, or community groups. It is our hope that we can thereby provide some guidance in the policy-making process.

RESEARCH 1973-74

2

That knowledge is power is an ancient dictum that has taken on new force with the astonishing rate of growth and change in the use of computer/communication/information tools in the past decade.

The making of public policy is a complex process not made any easier in this case by the dazzling new technologies policy-makers must comprehend and control.

The Program's research is intended to improve the quality of policy in this area by raising the level of policy discussion. We seek to provide background in policy for those with their roots in technology and understanding of technology for those who make policy.

Although informed by what has been, by what might be or what should be, and especially by what is, our studies emphasize building an understanding of actual ongoing processes and of the options or consequences likely to be foreclosed or favored by these processes. We hope, by our approach to policy, to reduce the risks of capture by anyone's one and only way, of the futility of tracking ephemeral intermediate outcomes, and of the absurdity of speculations on the unforeseeable.

The individual research projects described below vary greatly in form and focus and style. Some involve undergraduates, others involve scholars of reputation and learning. Some have been completed, others have hardly begun. The summaries below are intended only to provide an overall view of what the Program is doing. They do not purport to convey more than a brief sketch of any particular project. Even the larger categories are fluid. There are relations across categories as well as within them. The Program welcomes inquiries and suggestions concerning any of its research projects.

BASIC INFORMATION ON THE INFORMATION INDUSTRIES

Characterizing the vast and varied information industries is a fundamental task of the Program. Just as almost all our research contributes to this task, the efforts described below make an important contribution to almost all our other research.

A Rough Census of the Information Industries

Warren Lavey has made a rough census of the information/communication industries, with preliminary attempts at comparisons in size. It covers television (broadcast and cable), radio, telephone, domestic telegraph, the Postal Service, newspapers, book publishing and printing, periodicals, motion pictures, and computer services and software. Figure 1 on page 2 is a summary of his findings. Lavey's full report has been issued as a Program Publication under the title *Toward a Quantification of the Information/Communications Industries,* a revised and extended version of his earlier working paper on the same subject.

Carol Weinhaus, of the Program's staff, is continuing this project, extending Lavey's snapshot data into time series and developing descriptions of additional industries.

Lavey was invited to continue this research at the Institute for Computer Sciences and Technology of the National Bureau of Standards during the summer of 1974, but other research commitments, also growing out of Lavey's work at the Program, made this impossible. Lavey is an undergraduate in a combined bachelor's/master's degree program in applied mathematics. He has been working under Program direction for the past two years.

Information Goods and Services

Peter D. Shapiro, Research Fellow in Information Technologies and Public Policy, and **Anthony G. Oettinger** have prepared a 5000-word feature article, *Understanding Information Industries in America,* for the 1975 *Britannica Book of the Year.* The article gives the lay reader a broad view of the role information industries play in our society and of their impact on public policy. It will be one of two major features in the yearbook, running with another on world food supplies.

Encyclopaedia Britannica is an affiliated corporation of the Program. The article by Shapiro and Oettinger is based on the companion booklet to this *Review,* titled *The Scope of the Program, 1973-74.*

Bibliographic Tools

Carol Weinhaus has assembled bibliographic contributions by many Program participants into the working paper *Bibliographic Tools,* first issued in January 1974.

The first section of *Bibliographic Tools* is a list of directories, indexes, general references, loose-leaf newsletters, etc., containing bibliographic data, legislation, court and regulatory agency decisions, and quantitative data on information industries. The second section is a general annotated bibliography. Background articles on the science and technology of information systems are listed in the third section. The working paper concludes with a listing of audiotapes and videotapes of Faculty Seminars and other relevant presentations available through the Program or Harvard's Gordon McKay Library.

This document has proved valuable not only as a research tool but also to students in Program-affiliated courses. Copies have also been requested by several organizations outside the University. It will be revised and updated when necessary.

Specialized reports not published as conventional books, government documents and other relevant materials not readily available are being accumulated in a small Program library.

INDIVIDUALS INSTITUTIONS AND INFORMATION TECHNOLOGIES

New patterns of flow and control of information in and between organizations mean new patterns of power, and vice versa. The very suppliers and users of information are altered by the ways in which they supply and use information. The following research projects seek to illuminate the relationships in this cycle among individuals, organizations and information technologies.

What's Wrong with Management Information Systems?

Management information systems (MIS) are designed on the untested assumption that people will change their behavior greatly to assure consistency and reliability in their organizations's information system. **Chris Argyris** plans to test this assumption in full-time research to begin in the spring of 1975.

Argyris suspects that systems designed to maximize reliability and consistency, in fact encourage inconsistency and unreliability in those who are supposed to work with them. Such systems tend to create requirements that people find noxious and which they will resist overtly or covertly, he believes. Such tendencies are evident in public concerns about privacy and freedom of information emanating from the clients of organizations, but less public attention has been given to the effects of information systems on people within organizations.

Two major hypotheses will be tested in this research. The first concentrates on current MIS design practices and reactions to them. The second focuses on design improvements that might take these reactions into account. First: Current MIS design practices encourage both overdependence and, at the same time, antagonism; people react to this ambiguity by altering information inputs and otherwise misusing the system; this reduces both the current effectiveness of the systems and their long-term acceptance and utility. Second: Randomness, inaccuracies, and misrepresentations in conventional systems serve social functions which must be accounted for if future MIS designs are to be more effective than present ones.

Argyris is James Bryant Conant Professor of Education and Professor of Organizational Behavior at the Schools of Education and Business respectively and a member of the Program's Executive Committee. Informal planning of this project began in December 1973 and has involved Argyris and the Program staff as well as John Griffith of IBM, an affiliated corporation, and John W. Weil, then of Honeywell. More formal development of the proposal will begin late in the fall of 1974 when Argyris will have time now taken up by prior commitments.

The Quality of Information

Many decisions affecting the public are influenced formally or informally by conclusions drawn from information the public itself has supplied through polls, surveys, or other forms of marketing and opinion research. Television programming, company marketing and advertising, voting by the people or their elected representatives, and many other questions of public policy or public interest are affected by the use of survey data. As a consequence, the quality of data bases like the Nielsen TV ratings, the Gallup polls, or the Dun & Bradstreet corporate credit ratings is of considerable public importance.

Stephen A. Greyser has pursued some implications of these observations, first at a Faculty Seminar on April 8, 1974 under the title *Information from the Public for Decisions Affecting the Public,* and also in a forthcoming Program working paper. In the working paper, Greyser will present conceptual premises to serve as guidelines for future empirical or policy-option studies by the Program. Among the factors Greyser identifies as important in determining the quality of survey information are the technical difficulties (and cost tradeoffs) of gathering accurate data, the ethics and standards of research organizations, and public preferences on privacy.

Greyser is Professor of Business Administration and teaches advertising and consumer behavior at the Harvard Business School. He is also executive director of the Marketing Science Institute, a nonprofit center for research in marketing associated with the Business School.

Video Telephone

Peter Shapiro and **Tony Oettinger** have written a critique of *The Video Telephone – A New Era in Telecommunications – A Preliminary Technology Assessment* (Praeger, New York, 1974), a book by Edward M. Dickson and Raymond Bowers of Cornell's Program on Science, Technology and Society. The critique – with rejoinder and rebuttal – appears in the Autumn 1974 issue of the *Journal of Communication.*

Dickson and Bowers describe the technology of the video telephone and competing two-way visual communications systems and attempt to anticipate the broad consequences of a change from voice to video in the nation's telecommunications systems and also examine the consequences in such realms as medical care and education. Oettinger and Shapiro endorse the technological content of the book, but detect some omissions, and criticize the value of this "technology assessment" as a scholarly approach to helping policy makers.

The Program originally undertook this brief study at the request of the authors for collegial criticism. A subsequent request by the National Science Foundation's RANN (Research Applied to National Needs) program for a confidential evaluation of the book prompted a decision to seek open publication, in the belief that the published results of policy research at universities are best reviewed in open forum.

Transportation, Communications and Headquarters Location

Warren Lavey has broken new ground in using Dun's Market Identifiers, an extensive Dun & Bradstreet computer data base, to measure *empirically* how much considerations of transportation and communications influence decisions on where to locate corporate headquarters in manufacturing firms with a number of plants. His findings confirm the notion that physical closeness to the largest plant within a firm and to the headquarters of other firms is a highly significant factor in selecting a headquarters site. Lavey's paper *Transportation/Communications Considerations in the Location of Headquarters for Multi-Establishment Manufacturing Firms* is undergoing final review and revision prior to submission for publication.

How much physical closeness can be traded for closeness achieved through telecommunications is still a matter for investigation. Evidence presented at the May 13, 1974 Faculty Seminar by Robert Auray, Director of Business Research for AT&T Long Lines, an affiliated corporation, suggests that travel and telecommunications grow together and not at the expense of one another.

Like the critique of the videotelephone technology assessment above, Lavey's paper reflects the Program's interest in the long-range question of how joint growth or tradeoffs between information and transportation will affect the distribution of people, and of material and energy resources.

Lavey's work on this subject grew out of discussions in the graduate seminar, Public Policy 283b, *Information Technologies and Public Policy,* (see page 20), in the spring of 1974. Under the supervision of Professors Robert A. Leone and John R. Meyer of the Business School, it continued in the summer of 1974 at the National Bureau of Economic Research, of which Meyer is president. Further research is expected to follow in the academic year 1974-75.

JOCKEYING FOR MARKETS AMONG INFORMATION SYSTEMS

Much of the Program's research has focused on how information systems are being shaped and by whom, and on what are the possible outcomes of this jockeying and their effects on the users and suppliers of information and information technologies.

Public Policy and the "Specialized" Carrier Market

During his two years with the Program, **Peter D. Shapiro** studied the structure of the market for specialized, private-line telecommunications, such as the private telephone systems operated by nationwide firms and the high-technology data transmission systems like those operated by Microwave Communications, Inc. (MCI), or Packet Communications, Inc.

Conventional approaches to the making of telecommunications policy usually begin and end with the FCC. The Commission's regulations are seen as determining the market structure which, in turn, in this view shapes the performance of firms in the market. Shapiro finds the market structure far more complex, an interplay involving, to varying degrees, public policy, the strategies of firms, financing, technology, and the needs of telecommunications buyers.

Nor is public policy making limited to the FCC. Shapiro also examines the roles of Congress; the Courts; the White House Office of Telecommunications Policy; the Department of Justice; state public utility commissioners and their National Association of Regulatory Utility Commissioners; and the government agencies responsible for procuring communications facilities, notably the General Services Administration and the Defense Communications Agency.

In Shapiro's view, the monolithic public-policy-maker is replaced by the actions, not necessarily concerted, of many public bodies and by their interplay with the actions of other parties in an ongoing market structuring process.

Shapiro's conceptual framework and initial empirical findings are set forth in his Program working paper, *Hypotheses on the Interactions of Public Policy with Other Factors in the Structuring of an Information/Communications Market: The Case of the Specialized Communications Market.*

The text, charts and maps of the main introductory chapter of Shapiro's paper characterize the current services in the specialized communications market, the public's stake in the market and the parties involved in the structuring process. The bulk of the work details the interactions of public policy with each of the other factors in turn. In each case, major questions about the interactions are set forth, and hypotheses are developed about what strategies (including randomness) the various parties might be following. Empirical data, primarily from public records, supporting each hypothesis are also given.

These hypotheses give preliminary clues as to the nature of the goals of the various parties in the struggle over specialized carriage. They also suggest the effectiveness of each party in advancing its goals and set out the public stakes favored or disfavored by the existing market structuring process. (For complementary findings in the cable television field, see the discussion of Anne Branscomb's work on page 8.)

The work reported in this paper is a beginning of a larger research project described in a proposal entitled *Structure Determinants of Communications Markets: The Interplay of Public Policy with Other Factors* (page 31). The Program submitted that proposal to the RANN (Research Applied to National Needs) program of the National Science Foundation in August 1973, and NSF rejected it in February 1974. There were significant disagreements between the judgments of the Program's reviewers and NSF's. Accordingly, it was decided to work on a limited scale toward publishable preliminary results that would enable wider judgments to influence the decision as to whether or not to pursue the project further. At the same time, the record of evaluation of the proposal was communicated for their information to NSF management. Except as noted under *Cross-Subsidies in the Telephone Industry*, no further action is contemplated in this area pending reactions to Shapiro's working paper.

Shapiro was one of the early Program participants. In July 1974, he joined the staff of Arthur D. Little, Inc., an affiliated corporation.

Europe's Computer Industry

In his teaching and research on manufacturing policy in industrial organizations at the Business School, **Robert Hayes** has developed a number of interesting cases in telecommunications manufacturing. A digest of his paper, *Europe's Computer Industry: Closer to the Brink*, presented at a Faculty Seminar on March 25, 1974, appears in the Summer 1974 *Columbia Journal of World Business*. He has also developed cases in manufacturing electronic components and consumer electronic goods. Hayes, a Professor of Business Administration, joined the Program's Executive Committee in 1973-74 and plans a closer association with us in the coming year during which he will devote a major fraction of his time to cases in telecommunications.

Cross-Subsidies in the Telephone Industry

Money made by public utilities in high-profit areas is often used to subsidize service in low-profit areas. **Elizabeth Lazarus** is preparing research that will test the workings of theory and reality in the provision of rural telephone service.

In gathering her research materials, Lazarus is paying particular attention to the allocations of costs and benefits in the pricing and availability of telephone service across areas of varying population and traffic densities. She is also examining historical and contemporary precedents in American and foreign telephone services and comparing the telephone industry practices and preferences to those in electrical power, postal service, and so forth. She will also study the costs and benefits of various possible policy alternatives. Her work will complement Peter Shapiro's research on specialized carriers, discussed above.

Lazarus's interest in the regulated telephone monopoly developed while she was on the staff of Rep. Michael J. Harrington (D., Mass.) in the summer of 1973. She came to the Program's attention with her paper, *Can Interconnectors Ring with Ma Bell?*, submitted in Natural Sciences 130, *Communication in Societies*, a Program-affiliated course. She is an undergraduate in History. She returned to Harrington's staff, with partial financial support and guidance from the Program, in the summer of 1974 to continue her work on rural telephone service.

Traditional Libraries and New Information Services

At the invitation of the National Commission on Libraries and Information Science, **John C. LeGates**, Associate Director of the Program, and **Tony Oettinger** have undertaken a study of the relationships between traditional libraries and new information services to identify technological, economical and organizational aspects of these services that determine where and on what terms people can get access to information they need.

The novelty of "information" as a matter of public concern is illustrated by the relative newness of even the most traditional information storage and retrieval system, the public library. Although governments have always kept records and scholars have always gathered research materials, much of the development of the public library system took place in the last 100 years. The first proprietary and subscription libraries — open to anyone able to pay — evolved in New England in the 18th century. The first municipally supported free public library was established in Peterborough, New Hampshire in 1833, but even in 1919 a report on the Carnegie Libraries stated that "for the present the public authorities are scarcely anywhere fully alive to the necessity of providing free libraries, and in many parts of the country the library movement has as yet made little impression."

The libraries of today face not only the serious and expensive productivity problems faced by all service industries, but also the necessity of settling their relationships with even newer information services based on computers, telecommunications and other modern information technologies.

This reopens such issues as how services shall be allocated among the public and private sectors and with what direct or indirect payment mechanisms, the same issues that were fought over in the library movement in the last century. The objective of the Program's study is to illuminate for the National Commission and the public the operational factors likely to affect costs and benefits of various allocations of service functions, to identify the size and direction of forces in play and to make some estimate of their relative weights so that practical public policy alternatives and their consequences for the public can be better understood.

The proposal to the National Commission was submitted in April 1974 and a contract received in July 1974.

The Realities of Cable Television

The endemic problems of the CATV industry are analyzed by **Anne W. Branscomb** in her article, *The Cable Fable: Will It Come True?* which appears in the Winter (1974-75) issue of the *Journal of Communication*. She was formerly communications counsel for the TelePrompTer Corporation and she takes that firm's financial crisis of late 1973 as a case in point. She directs attention to blue-sky promises, unskilled personnel, lack of programing or new services, lack of venture capital, and overregulation by local, state and federal governments. Her proposals for new policy directions include cooperation with existing technologies for developing new services; encouraging cross-investment of one technology in the development of another; divorce of control over content and conduit; more local and regional planning; and commitment of public funds for investment in cable hardware and software.

The development of this paper illustrates something of the Program's own processes. Branscomb, now vice president of Kalba Bowen Associates, Inc., was invited to discuss the cable industry before a Faculty Seminar February 4, 1974. A background paper for the presentation, *The TelePrompTer Syndrome and its Aftermath: Can Cable Fulfill its Promise?*, was passed through the Program's normal reviewing process (see page 23). The complete article developed after the review, with its analysis of the structuring of the cable industry, complements Peter Shapiro's work on the specialized common carriers discussed above.

Overlapping Jurisdictions and Electronic Funds Transfer

Daniel Prives spent the summer of 1974 on the staff of Federal Communications Commissioner Robert E. Lee studying the overlapping interests of the FCC and the Federal Reserve Board in a proposed national electronic funds transfer mechanism.

The Federal Reserve Board has proposed a revision of its Regulation J governing payments flow which would establish a new means of funds transfer based on advances in computer and communications technologies. The proposed new system would alter payment functions among the federal government, commercial banks, thrift institutions, merchants and others involved in the transfer of payments by cash, charge cards, credit cards, checks, and drafts, and also alter the forms in which individuals make payments and get credit.

Prives is interested in the points where FCC and FRB jurisdictions are likely to overlap. When is the transmission of payments common carriage and when not? On what basis will these transmission and related data processing functions be allocated? Will they go to private enterprise or some public body? What are the likely consequences of such choices for the public?

As Paul Berman's study of the FCC's role in allocating functions at the border between computer and communications shows (see page 10), the legal devices of the FCC have been placed under a great strain by technological developments. By studying similar processes at play in the FRB's attempt to change Regulation J, Prives hopes, in collaboration with Berman, to shed additional light on generic questions arising from delegation of Congressional authority to administrative agencies. As Berman has pointed out, the FCC's mandate from Congress has not been significantly changed in 40 years and was originally based on concepts devised for regulation of transportation.

Plans for Prives' study were laid following conversations with Lawrence Stone, Vice President and General Counsel of the Federal Reserve Bank of Boston, an affiliated organization, and Chairman, Subcommittee of Counsel on Communications and Payments, Committee on Communications and Payments of the Federal Reserve Board; with John Kimball, of the legal staff of the Federal Reserve Bank of Boston; and with Martin Ernst, of Arthur D. Little, Inc., who directs a study of electronic funds transfer that ADL has undertaken for the National Science Foundation. When Commissioner Lee took Prives on his staff for the summer, it was agreed to proceed with the plans under partial supervision by the Program and in coordination with the Federal Reserve Board. Prives is a second-year law student and philosophy graduate of Harvard College.

Information Technologies and Control over Learning

Nikki Zapol, on the program staff since the beginning, and **Paul DiMaggio**, a graduate student in sociology, plan to make a close comparison of the decision-making processes that shape the information flowing through educational broadcasting and textbook publishing.

The commercial, legal, financial, and regulatory frameworks of publishing and broadcasting, the relationships among the participants in the flow of information from creator to user and the social control of information usage differ widely between these two educational media. What changes may we expect in the relative usage of print and broadcast, whether in schoolor in less formal learning situations? How are these changes likely to affect control over learning? Who are the policy-makers and what are their options? What are the likely consequences for which learners? For which industries? With what likely effects on individual values? On social values?

The proposed approach is a comparison of books and broadcasting aimed at American schoolchildren to develop an understanding of the extent to which differences in decision-making patterns in these two media are reflected in the choice of substance transmitted to learners. How are decisions made to publish or produce? How are materials adopted or accredited? How do materials reach the learner? How are the materials used by teachers? How do these decisions affect one another in the marketplace and the political arena? How do the flows of private and government funds affect all these processes? Preliminary findings will be included in a forthcoming Program working paper.

In framing these questions and in gathering preliminary data, Zapol and DiMaggio have benefited from the advice and criticism of Laurence H. Tribe, a Professor of Law whose interest in how the choice of means for reaching desired ends can shape basic values of society was the original stimulus for this study. Zapol and DiMaggio have also had help in the preliminary stages from Paul Berman, of the Law School, and from many people in broadcasting and in publishing.

One unforeseen outcome of this study has been Nikki Zapol's decision to enter the Law School, resuming her academic career after eight years of varied professional work. She will work part-time on this research, as will Berman and DiMaggio. They will be joined by **David Seipp**, a sophomore, who first came to the Program's attention through his paper *McGuffey in Wonderland: Educational Publishing*, which he submitted in the fall of 1973 to Natural Sciences 130, *Communication in Societies*. The Program participates in teaching the course.

Newspapers and Information Systems

Vincent E. Giuliano led a discussion of the role of information technologies in the present and future of newspaper publishing at the Faculty Seminar on April 15, 1974. Giuliano is a member of the staff of Arthur D. Little, Inc. As a result of his presentation, discussions of a possible joint study of the question by the Program staff and ADL have begun.

Under the title *Changing Newspapers — What are the Forces?*, the study would examine the functions now bundled in the newspaper format — news reporting, editorial commentary, feature material, classified and display advertising, recipes and services — and examine the technological, economic, legal and policy trends that might influence the allocation of these functions. Will they continue to be distributed through newspapers or even through newspaper companies? What organizations outside the news industry are likely to be involved? What will be the effects on the public?

Such a study would mark a new form of endeavor for the Program. Our experience with individual collaborators not otherwise affiliated with the University has been excellent with mutually recognized benefits, but this proposal presents an opportunity to assess the potential effectiveness and viability of major joint undertakings, which we have not yet tested in our framework.

REGULATION OF INFORMATION SYSTEMS

Conflict over control of information has produced many different patterns of free and regulated markets, and of private and public information enterprises. The studies described in this section emphasize the regulatory processes and skirmishes at the borders between regulated and free markets. They consider such questions as: What distinguishes communication services from data processing services and what difference does that make to whom? How are decisions made locally? Nationally? By whom?

The FCC at the Computer/Communications Border

The technologies of computers and communications have grown more and more alike over the years, but the regulatory mechanisms of the Federal Communications Commission were designed for the technological formats of the telegraph, telephone and broadcasting industries of 1934 and they have not changed. As a result, the FCC has had some difficulties in dealing with the advent of new computer communications technologies. In his study, *Computers or Communications? Allocation of Functions and the Role of the FCC*, which was completed in May 1974, **Paul Berman** studied in considerable detail the Commission's attempts to catch up with technology.

In 1971, the FCC confirmed a previously tentative decision, known generically as the Computer Rules, which showed where, by its lights, the FCC felt the boundary should be drawn between computers and telecommunications, or, more precisely, between regulated and unregulated data processing and transmission. Warfare at this border continues to flare up. In the summer of 1974, for example, IBM expressed its intent to acquire a communications satellite subsidiary. The public has a considerable social and economic stake in which services of this sort are regulated and which are not.

In his research, Berman compares three services. They are directory assistance, automatic location of callers through the "911" emergency number, and packet-switched computer-to-computer communications. Drawing on these examples, he develops the legal and technological factors supporting or undercutting the FCC and those who seek an unregulated market, the options available to policy-makers, and the consequences likely to flow from exercising any option.

Berman's conclusion is that "the decision to employ the FCC's allocation mechanism need not have been made by the Commission, and indeed may not have been an appropriate decision for it to make", and that in all likelihood the decision will have to be made again by other policy-makers, including Congress and the courts.

Versions of Berman's paper will appear in *Policy Analysis*, the *FCC Bar Journal*, and *Scientific American*. Some 200 copies of an earlier draft were distributed by the Program following the announcement of its availability as a working paper in *Telecommunications Reports*, November 26, 1973. Berman also led a seminar entitled *Value-Added Services — Opportunity for a Second-Tier Communications Industry* in Washington at the invitation of the Office of Telecommunications of the Department of Commerce on January 25, 1974.

Berman is a third-year law student and a Harvard graduate in computer science. He has been with the Program since its inception. He spent the summer of 1974 on the staff of Kaplan, Livingston, Goodwin, Berkowitz & Selvin in Beverly Hills, California.

Local Regulation of Cable Television

Cable television is regulated not only by the FCC, but also by local governments and by some states. Prescriptive literature on what the behavior of local regulators should be is abundant, but much less has been written about what their behavior has turned out to be.

In his Program working paper, *City Meets the Cable: A Case Study of Cincinnati's Decision Process*, **Konrad K. (Kas) Kalba** has partly corrected the imbalance. Kalba describes the national context in which Cincinnati's decision to postpone wiring the city for CATV took place, and identifies the interests and the efforts of public officials, franchising applicants, CATV experts, community groups, and members of the general public who participated in these deliberations. The paper was the result of extensive use of printed national and local information as well as more than forty interviews with public and private participants in the process. The paper concludes with an assessment of the process and of the lessons to be learned from it.

The working paper is being revised for publication in *Policy Analysis*. Kalba is a Lecturer in City Planning at the School of Design and President of Kalba Bowen Associates, Inc. He has been associated with the Program since its inception and chaired a planning committee that developed our original directions. He is a doctoral candidate in city planning at the University of Pennsylvania and is preparing his thesis on the planning of urban cable television systems.

Communications Satellite Policy

Roger Kvam, a doctoral candidate in political science, is working on a thesis titled *Ideology and Policy: A Study in the Development of the Communications Satellite Corporation, 1963-1973.* Kvam's background research to date has included studies of the antitrust, anti-bigness ideology, the effects of this ideology on the COMSAT legislation, the struggles, compromises and questions that led to the creation of COMSAT, and the further struggles, compromises and questions that followed the creation of COMSAT.

Kvam was referred to the Program early in 1974 by Don Price, Dean of the Kennedy School of Government. William M. Capron, of the Program's Executive Committee, and Tony Oettinger both participate in overseeing Kvam's thesis work.

Determinants of FCC Decisions

Richard Berner has completed a study of the forces which shape the FCC's cable regulatory process. After analyzing salient decisions in the history of cable regulation, Berner focuses on the most recent cable rules. He analyzes in detail the industry groups' "consensus agreement" which successfully altered the Commission's choice of cable regulations. He suggests that, as a result of the process fostered by this "agreement", "extra-agency groups were able to determine FCC outcomes by so structuring the Commission's options that their choice became that which . . . best served the combined interests of these extra-agency groups".

Berner then proceeds to analyze the process by which the Commission implements its cable rules. He notes that here intra-agency forces seem to shape FCC decisions. Citing James Q. Wilson's observation "If the agencies have been captured by anyone it is probably their staffs", Berner analyses the role of the Cable Television Bureau in the rule enforcement process. Contrary to traditional views of administrative behavior, Berner maintains that the Cable Bureau has a direction and purpose distinguishable from the Commission as a whole. Using several case examples to demonstrate his argument, he shows how by using its control over information and other delegated responsibilities, the Cable Bureau is able to influence the rule enforcement process.

Berner's interest in the cable situation began in the spring of 1973 while he was working in the office of then FCC Commissioner Nicholas Johnson. His first paper on the subject was prepared for the Program that summer. His research became his senior thesis, *Constraints on the Regulatory Process: A Case Study of Regulation of Cable Television*, which was rated summa cum laude upon his graduation in June 1974 by a committee comprising William M. Capron, lecturer on Political Economy and Associate Dean of the Kennedy School of Government; Dan H. Fenn, lecturer on Business Administration and Director of the Kennedy Library; and Irene Taviss Thomson, formerly lecturer on Sociology.

The thesis has been revised under Program guidance and issued as a Program paper and also submitted for publication. Berner has entered Columbia University's Law School.

Technical Experts and the FCC

For many years, the FCC and the telephone companies agreed that nothing not provided by the companies themselves could be attached to the phone system in any way. "Foreign attachments", it was argued, could cause technical "harm" to the telephone network. Even plastic dial attachments and cord curlers were prohibited in theory. In its *Carterfone* decision in 1968, however, the FCC reversed its position, opening up a large market in telephone accessories and attachments, including provision of instruments, switchboards and other technical facilities that were once exclusively part of the protected monopoly of the phone companies.

In the spring of 1974, **David Russell**, an undergraduate in a joint program in Social Studies and in Engineering and Applied Physics, wrote a paper entitled *Experts and Outcomes: The Role of Technicians in Public Policy* for Public Policy 283b, *Information Technologies and Public Policy*, a Program-affiliated course. The paper and other work led to his receiving a Summer Award of the Kennedy School's Institute of Politics. This award is designed to encourage direct observation of political and governmental processes in the United States. Russell spent the summer of 1974 in Washington studying the role of technicians in the formation of policy in the "foreign attachments" and interconnection area. His new paper, *Engineers and Lawyers at the FCC*, will be developed into his undergraduate thesis during 1974-75.

BACKGROUND INFORMATION STUDIES

Not all the issues addressed by the Program are tied directly to the various information technologies. We have also felt the need to develop for the Program some general background in the formation of public policy. What kind of information is available for making decisions? How is it framed? What effects does general outlook of the decision-makers have on specific policy questions? The work described in this section concerns such general policy issues and our approach to them.

The Process of Legislative Compromises

The making of legislative and other public policy compromises is little understood. To outside observers, some legislative compromises seem to endanger cherished principles, while others seem purely cosmetic to attract a few additional votes. Public policy compromises relying partly on competition and partly on regulation often are faulted by those who prefer exclusive reliance on one or the other. **Kurt Borchardt**, retired legal counsel to the Committee on Interstate and Foreign Commerce of the U.S. House of Representatives, has written *Toward a Theory of Legislative Compromise* to appear in the *Harvard Journal on Legislation.*

In his paper, Borchardt argues that compromise is an essential element of legislation, except in those rare instances where polarized positions command overwhelming public support. His argument is supported with extensive examples from his own Congressional staff experience. Borchardt notes that regardless of the subject being legislated, interactions among three factors determine the chances of passage. They are the individual "style" of the legislators who play leadership roles regarding the legislation under consideration, the institutional setting, and the subjective assessments these legislators make of the issues. He concentrates on this last point, arguing that in order to enhance chances of passage, legislators seek to avoid sharp, polarized issues and search for subtly shaded information on the issues which will tend to reduce their "voltage".

Issues in appropriation legislation, he argues, are naturally low voltage because the information pertaining to such issues has already been explored in authorizing legislation and because quantities of money can readily be increased or decreased. Everyone already knows what the Agriculture Department is authorized to do, and the decision involves merely whether it should do more or less.

Sometimes it is possible to lower the voltage of issues through imaginative use of legislative skills. While the issue of *federal aid* to schools of public health was sharply divisive when introduced in Congress in 1946, a bill *reimbursing* the schools for expenses incurred in connection with Federal training programs of public health personnel passed easily.

Controversial policy objectives frequently are attainable by resorting to elaborate forms of administrative arrangements designed to achieve wanted objectives by indirection, and the paper cites numerous examples.

Borchardt has been associated with the Program as a consultant for two years. In January 1974, he led a discussion in the Faculty Seminar on devising public policy compromises and later wrote a working paper on the same subject. The paper was read into the record of hearings on February 5, 1974, held by the Subcommittee on Government Information on the House Committee on Government Operations. The Subcommittee is chaired by Rep. William S. Moorhead (D., Penn.).

The approaches suggested by Borchardt will be explored further in future Faculty Seminars devoted to discussing anticipated benefits to be derived respectively from competition and regulation in various information industries.

Making Complex Decisions

Standard analyses of political decision-making attempt to explain or guide policy in terms of a more or less explicit calculus whereby all possible options are tested for their contribution toward maximizing explicit goals. Individuals and organizations involved are viewed as "rational actors" working within an "analytical paradigm". In his book, *The Cybernetic Theory of Decision: New Dimensions of Political Analysis* (Princeton University Press, 1974), **John D. Steinbruner** argues for more reality and less abstruse rationality.

Steinbruner focuses on the irremediable *complexity* of most decision-making situations and on the failure of prevalent political theories to account adequately for decisions made in complexity. Some variants on standard theories take into some account the dispersal of decision-making power concealed by the image of the monolithic actor – "Moscow's policy is . . . "; "the White House wants. . ." – as well as the multiplicity and flux of values represented in any decision. Steinbruner distinctively carries this awareness of complexity to another stage by taking into account the imperfect correspondence between the information on hand and reality. Drawing from concepts developed by cognitive psychologists, logicians, and computer scientists scientists, Steinbruner develops an alternative theory of decisions and tests it on various examples, particularly on the decisions about the shar sharing of nuclear weapons through a multilateral force (MLF).

To assist Steinbruner in the further development of his theories, and to draw on them for its own purposes, the Program has established a discussion group for the fall of 1974 including Steinbruner along with Hendrik Bode and John Griffith, both long affiliated with the Program's research; Oliver Selfridge, Senior Research Associate at MIT; Edward O. Wilson, Professor of Zoology; and members of the Program staff. Vincent Mosco's proposed thesis on broadcasting policy (discussed below) will draw significantly on Steinbruner's theories and provide additional tests of their merit and utility.

Steinbruner is Associate Professor of Public Policy and Assistant Director of the Program for Science and International Affairs.

Absorption of Broadcasting Innovations

Vincent Mosco, a doctoral candidate in Sociology, is developing a thesis proposal on how the FCC has dealt with such broadcasting innovations as FM radio, UHF television, cable television (CATV), and pay-TV. He will draw heavily on previous Program research as well as other case studies from recent years. He will also employ the theoretical approach of John Steinbruner (discussed above).

One hypothesis Mosco plans to test is that, in each case, the outcome of policy-setting was the placing of each innovation into a role ancillary to the form of broadcasting dominant at the time the innovation was introduced. He further believes, "The most useful way to compare the policy-making processes that led to such outcomes as the evidence supports is to consider them as responses to structural complexity that do not conform to traditional notions about rational decision-making."

Mosco's comparisons will afford an opportunity to compare the explanatory power of Steinbruner's theories against that of standard theories. The soundness of both prevalent criticisms of FCC procedures and proposed remedies could be significantly challenged and recommendations for more effective alternatives proposed if, indeed, Steinbruner's theories are supported by the evidence in these cases.

Mosco had his attention called to the Program in the fall of 1973 by Daniel Bell, Professor of Sociology. His thesis proposal is being reviewed in the fall of 1974 by a thesis committee chaired by Bell that also includes Christopher S. Jencks, Professor of Sociology, and Tony Oettinger.

An Evolving Framework

Under the title, *An Evolving Framework for the Program*, a synthesis seeking to describe the interrelations and underlying unity of the Program's work is regularly redrafted and updated. This is not properly a research project, but it makes an important contribution to the coherence and continuity of the Program's research. All present and prospective Program participants may contribute to this work and all may draw on it in framing their own research.

COMMUNICATION 1973-74

3

Communication activities are essential to keeping the Program in close touch with diverse realities. The pursuit of breadth is a particularly difficult undertaking. "It may never have crossed your mind", Donald Barthelme once wrote, "to think that other universes of disourse distinct from your own existed, with people in them, discoursing."[1]

A group of individuals with the most diverse intellectual pedigrees and personal experiences has no effective breadth without an intimate sharing of universes of discourse among its members. Multidisciplinary chit-chat or mere respect among specialists and generalists are not sufficient for shared understanding.

Entering comprehendingly into another universe of discourse is a shattering experience as Alice learned over and over. Many never have the experience and others never recover from it. Partitioned academic organization often not only fails to prepare for it, but actively discourages it. Pressures to keep noses to the grindstone have similar effects in the non-academic world.

The wonder therefore is not that it takes time for mutual understanding and teamwork to develop within a group, but rather that anything ever develops at all. The communication activities of the Program emphasize processes aimed at developing such teamwork.

This point of view applies not only to the individuals affiliated with the Program, but also to the Program itself in its relations with the universe of discourse we are studying, the "real world" of information technologies and public policy. That is, we have sought to keep the Program in discourse with the world, and vice versa.

In our research, this has meant seeking out first-hand experience whenever it is relevant. Policy-makers in politics, business, and government have been interviewed for research, have presented seminars, have served as commentators, reviewers, and advisors, and occasionally as researchers.

The section that follows reports specifically on our efforts at reaching the broad and narrow publics interested in information policy, including our contacts with government, business, other universities and research centers, and interdisciplinary relations on the Harvard campus.

The Faculty Seminar

The Faculty Seminar was one of the Program's first activities, beginning in September 1972 and continuing through the academic year 1973-1974. Despite its title, participation in, attendance or presentation is not limited to faculty members. Selected undergraduates and graduate students take part, as well as a substantial number of participants from outside the academic community and outside the Boston-Cambridge area.

The discussion topics for the 1973-74 seminars are given in Figure 3. They include not only reports on Program research, planned, underway, or completed, but also discussions of technological or policy developments in our universe of discourse.

Discussions have been informal and lively. Frank admissions of incomprehension and fitting translations of terms and other explanations are encouraged and forthcoming.

Tape recordings and informal notes are available from all the Faculty Seminars. In some cases, more formal reports or working papers are also available. See the listing of papers available from the Program on page 29.

Individual Program Affiliates

The Program has created, and is in the process of expanding, a

[1] Donald Barthelme, *Snow White*, Athenaeum, New York, 1967, p. 44.

October 4	**WHO DOES WHAT AT THE COMPUTER/COMMUNICATIONS BORDER: ALLOCATION OF FUNCTIONS AND THE ROLE OF THE FCC:** Paul Berman, Harvard Law School, '75
October 11	**SATELLITE TECHNOLOGY and ECONOMIC, MARKET AND POLICY FACTORS:** Richard B. Marsten, Director, Communications Program, Office of Applications, NASA
November 1	**PLANNING BY REGULATION:** William S. Comanor, Visiting Professor, Department of Economics
November 8	**VALUE OF "STATISTICAL OVERVIEW OF THE INFORMATION/COMMUNICATION INDUSTRIES": WHAT IS TO BE GAINED FROM A STUDY WITH NO ANALYSIS AND NO CONCLUSIONS?:** Warren G. Lavey, Harvard College, '74
December 13	**A FIRST GENERATION ECONOMIC AND DEMOGRAPHIC MODEL OF ORGANIZATIONAL COMMUNICATION SYSTEMS:** Anthony S. Niskanen, Staff Member, Arthur D. Little, Inc.
January 14	**ONE ASPECT OF PUBLIC POLICY FORMATION: DEVISING COMPROMISE PROPOSALS IN PUBLIC POLICY CONFLICTS:** Kurt Borchardt, formerly Legal Counsel to the Committee on Interstate and Foreign Commerce, U. S. House of Representatives
January 21	**REORGANIZING KNOWLEDGE SYSTEMS TO IMPROVE POLICY-MAKING:** Manfred Kochen, Professor in Information Science and Urban/Regional Planning, University of Michigan
February 4	**THE TELEPROMPTER SYNDROME AND ITS AFTERMATH: CAN CABLE FULFILL ITS PROMISE?** Anne W. Branscomb, Esq., formerly Communications Counsel for the TelePrompTer Corporation
February 19	**HOW THE LAW TREATS INFORMATION:** Harry Bloom, Director, Legal Research Center for Communications and Computers, University of Kent at Canterbury
February 25	**OPTICAL TRANSMISSION TECHNOLOGIES: PROGRESS AND PROBLEMS TO DATE:** R. Victor Jones, Professor of Applied Physics, Division of Engineering and Applied Physics

Figure 3. The Faculty Seminars – 1973/74

network of interested people outside the University. These include specialists and generalists from government, the information industries, the legal profession, other academic institutions, etc.

These persons have participated as advisors, seminar leaders or discussants, project reviewers and information sources. Others simply keep themselves posted. The exact number of these people or of the communications with them cannot be counted. However, the number of substantial contributions runs into the dozens and of aggregate communications into the hundreds.

Particularly close and continuing associations have been established with Hendrik Bode, Gordon McKay Professor of Systems Engineering, Emeritus, and formerly Vice President, Military Systems Engineering, Bell Laboratories; Kurt Borchardt, formerly legal counsel to the Committee on Interstate and Foreign Commerce, U.S. House of Representatives, and author of *Structure and Performance of the U.S. Communications Industry*[2]; John Griffith of the IBM Thomas J. Watson Research Laboratories, Yorktown Heights, N.Y.; Erwin G. Krasnow of the law firm of Kirkland, Ellis and Rowe, Washington, D.C. and author of *The Politics of Broadcast Regulation*[3]; and Irene Taviss Thomson, formerly lecturer on Sociology at Harvard, and editor of *The Computer Impact*.[4]

Clay T. Whitehead, formerly Director of the Office of Telecommunications Policy in the Executive Office of the President of the United States, will be affiliated with the Program as a research fellow in 1974-75, while serving also as a fellow of the Kennedy School's Institute of Politics and a research associate at the Massachusetts Institute of Technology's Center for International Studies.

Our effort to expand this network of affiliates is described on page 21.

Publications and Presentations

The Program's efforts at bringing its findings before policy-makers, other scholars, and the general public are not merely institutional public relations, but a natural result of our choice of a field of study and of our approach to it. Although from the beginnings of the Program we planned to make special efforts at dissemination, much of what we have done in this area has been in reaction to the interests of others as much as it has been the result of conscious planning. The process can be shown best in examples.

Figure 4 outlines the "life" thus far of Paul Berman's study of the FCC's problems in separating digital technology used for data processing from digital technology used for communications so that it could regulate the latter without regulating the former. Berman is a law student with an undergraduate degree in computer science and thus interested in both the technical and legal aspects of the situation. He presented his ideas in a Faculty Seminar in May 1973 where they were favorably received. He revised his notes over the summer and they were then published as a working paper, announced in *Telecommunications Reports* and then attracted considerable attention in that form. In January 1974 Paul presented a seminar in Washington for federal policy-makers and he has since given other presentations. In the meantime, Berman's working paper was undergoing the Program's review process as described on page 23. With the results of this review and his own further research in hand, Paul went to work in close collaboration with one of the Program's consulting editors smoothing, polishing and clarifying his report of his findings.

[2] Division of Research, Harvard Business School, Boston, 1970.

[3] With L.D. Longley, St. Martin's Press, New York, 1973.

[4] Prentice-Hall, Englewood Cliffs, New Jersey, 1970.

The resulting Program Publication is equally accessible and acceptable to the technologist, the lawyer, and the layman with an interest in the problem, insofar as such a thing is possible at all. Finally, the research work was submitted to a number of appropriate journals. It was accepted by *Policy Analysis*, the *FCC Bar Journal* and *Scientific American*.

This approach of reaching disparate publics through their particular publications had its roots in our experience with the article, *Will Information Technologies Help Learning?*, written by Tony Oettinger and Nikki Zapol before our formal constitution at Harvard. The article was commissioned by Carl Kaysen for the collection, *Content and Context: Essays on College Education* (McGraw-Hill, New York, 1973), which Kaysen edited for the Carnegie Commission on Higher Education chaired by Clark Kerr.

Circulation of a draft for critical comment led directly to publication in the *Teachers College Record* and its appearance there and in the Carnegie volume resulted in additional republication, as illustrated in Figure 5. The article also earned the Paul C. Reed Memorial Award of the Educational Press Association for excellence in educational journalism for 1973.

Working papers and other formal and informal Program publications are listed on page 29. As that listing indicates, early dissemination to specialized audiences is aided by the distribution services of the National Technical Information Service of the Department of Commerce. Other early circulation is achieved through the Program's review process, its mailings, and informal associations of Program staff and affiliates.

Formal publications outside the Program also include the following:

Paul Berman, *Computers or Communications? Allocation of Functions and the Role of the FCC*, accepted by *FCC Bar Journal, Policy Analysis*, and *Scientific American*;

Kurt Borchardt, *Toward a Theory of Legislative Compromise*, accepted by the *Harvard Journal on Legislation*;

Anne W. Branscomb, *The Cable Fable: Will It Come True?*, *Journal of Communication*, Winter 1974-75;

Robert Hayes, *Europe's Computer Industry: Closer to the Brink*, digested in the *Columbia Journal of World Business*, Summer 1974;

Konrad K. Kalba, *Urban Telecommunications: A New Planning Context*, in *Socio-Economic Planning Sciences*, January 1974;

Konrad K. Kalba, *City Meets the Cable: A Case Study of Cincinnati's Decision Process*, accepted by *Policy Analysis*;

Anthony G. Oettinger and Peter D. Shapiro, *Understanding Information Industries In America*, to be featured in the 1975 *Britannica Book of the Year*;

Anthony G. Oettinger, *Lasers, Computers and the First Amendment*, in *Nieman Reports*, Spring/Summer 1974;

Peter D. Shapiro and Anthony G. Oettinger, review of *The Video Telephone* with rejoinder and rebuttal, *Journal of Communication*, Fall 1974.

In addition to these formal publications, Program participants made presentations at a number of forums and seminars outside the University:

Kas Kalba served as co-chairman of the Urban Telecommunications Workshop at the annual conference of the American Institute of Planners in Atlanta October 23, 1973, and also spoke on *Planning Developments in Urban Communications*.

On December 4, 1973, Tony Oettinger addressed the Transportation Data Coordinating Committee in Washington, D.C., on *Compu-*

March 4	**CONTROL OF LEARNING: DO NEW INFORMATION TECHNOLOGIES AND NEW INSTITUTIONS MAKE A DIFFERENCE? Nikki Zapol, Staff Member, Program on Information Technologies and Public Policy**
March 11	**ANALYSIS OF DEMAND FOR VIDEO COMMUNICATIONS: Jeff Rohlfs, Bell Laboratories**
March 18	**CITY MEETS THE CABLE: A CASE STUDY OF CINCINNATI'S DECISION PROCESS: Konrad K. Kalba, Instructor in City Planning, Graduate School of Design**
March 25	**EUROPE'S COMPUTER INDUSTRY: CLOSER TO THE BRINK: Robert Hayes, Professor of Business Administration — Business School**
April 8	**INFORMATION FROM THE PUBLIC FOR DECISIONS AFFECTING THE PUBLIC: Stephen A. Greyser — Professor of Business Administration, Business School, and Executive Director, Marketing Science Institute**
April 15	**WHITHER NEWSPAPERS? WHITHER NEWSPAPERS?: Vincent E. Giuliano, Staff Member Authur D. Little, Inc.**
April 22	**THE COMING OF POST-INDUSTRIAL SOCIETY: Daniel Bell, Professor of Sociology, Faculty of Arts and Sciences**
April 29	**THE CHANGING RESEARCH LIBRARY: Douglas W. Bryant, Director, Harvard University Library, Professor of Bibliography**
May 6	**HOW THE MEANING OF INFORMATION IS CHANGING: Samuel Lubell, Fellow, Institute of Politics**
May 13	**RELATIONSHIP BETWEEN TRAVEL AND TELECOMMUNICATIONS: Robert R. Auray, Director — Business Research, AT&T Long Lines**
May 20	**THE POTENTIAL IMPACT OF THE COMMUNICATIONS REVOLUTION ON HEALTH CARE DELIVERY: Maxine L. Rockoff, Health Scientist Administrator, Bureau of Health Services Research, Department of Health, Education and Welfare**
May 28	**MANY CAREER SCHOOLS TURN EDUCATION INTO A FAST BUCK: Gerald M. O'Neill, Head, Boston Globe Spotlight Team**
June 3	**TAX LAW AND COMPUTER TECHNOLOGY — THE IMPACT ON INDUSTRY PARTICIPANTS AND GOVERNMENTS: Roy N. Freed, Esq., Peabody, Brown, Rowley & Storey**

Figure 3. The Faculty Seminars — 1973/74 *continued*

COMPUTERS OR COMMUNICATIONS? ALLOCATION OF FUNCTIONS AND THE ROLE OF THE FCC

May 1973	Idea presented to Faculty Seminar
September 1973	Working Paper issued
November 1973	Announcement in TELECOMMUNICATIONS REPORTS 200 requests filled
January 1974	Seminar at Office of Telecommunications of Department of Commerce, IBM, etc.
May 1974	Program publication issued; submitted to National Technical Information Service and to journals
August 1974	Publication scheduled in FCC BAR JOURNAL, POLICY ANALYSIS; revision underway for SCIENTIFIC AMERICAN

REVIEWING PROCESS

EDITORIAL CONSULTATIONS

Figure 4. The Life of a Study

ter/Communications Impact on the Future.

In January 1974, Paul Berman presented a seminar at the Office of Telecommunications in the Department of Commerce as discussed on page 14 and in Figure 6.

The Subcommittee on Government Information of the House Committee on Government Operations took testimony from Oettinger on information issues. The Program's *Scope* document was also read into the record. See Figure 7.

The Program Director also lectured in a series on public issues in the sciences sponsored by the Episcopal Chaplaincy of Harvard and Radcliffe. See Figure 8.

Nikki Zapol and Oettinger took part in the Airlie House Conference on Telecommunications Policy Research in Warrenton, Va. in April 1974. Both organized and served on a panel discussing *First Amendment* questions, and participated in a seminar on *Interdisciplinary Research Programs.*

At the annual convention of the National Cable Television Association, April 22, 1974, Kas Kalba served on a panel on *Cable Regulation* at the Main Management Session.

Tony Oettinger served on a panel on *Interconnect, Its Electronic Effect, Its Effect on the Rate Base and the Cost of Service* at the New England Conference of Public Utility Commissioners on Martha's Vineyard, June 17, 1974.

In 1973-74, Oettinger continued to serve as a member of the Community Antenna Television Commission of the Commonwealth of Massachusetts and as chairman of its Committee on Regulation. He is also an adviser to the Subcommittee on the Economic and Social Impact of the New Broadcast Media of the Committee for Economic Development.

Drawing on Harvard's Resources

The expansion of the Program's interests beyond the borders of the United States (see page 19) has been accompanied by an expansion of the Program's relations with other research institutes on the Harvard campus.

Conversations with Raymond M. Vernon, Professor of International Business Management and Director of the Center for International Affairs (CFIA), led to cooperative plans between the Center and the Program. Initial steps include a series of joint seminars on international telecommunications in the fall of 1974. The seminars will be planned with William H. Read of the United States Information Agency, currently a Fellow of the CFIA. Read is studying the role of international communications organizations at the Center and also working with the Program and several of its affiliated corporations in planning a conference on operating problems of users of world-wide communications systems.

Preliminary discussions with Ezra F. Vogel, Professor of Sociology and Director of the Center for East Asian Studies, have explored possible collaboration with the Program in research on Japan's increasingly important role in the information technologies.

The Program also looks forward to the service of Laurence E. Lynn as Professor of Public Policy at the Kennedy School of Government beginning in 1974-75. Lynn's plans include not only teaching and research, but also organizing and directing the performance of policy research within the Kennedy School and, most significantly, cultivating appropriate research relations with faculty and students in other schools of the University. The Program has already developed close ties with the Kennedy School, and Lynn's activity in this area should provide easier and more effective communications

teachers college record

Teachers College, Columbia University
September 1972, Vol. 74, No. 1

STRATEGIES FOR CHANGE IN INFORMATION PROGRAMS

Edited by William E. Hug

Department of Educational Media
School of Education
Auburn University

Content and Context

ESSAYS ON COLLEGE EDUCATION

edited by *Carl Kaysen*
Director, The Institute for Advanced Study
Princeton, New Jersey

with chapters by *Laurence Veysey*
Roger Shattuck
Neil J. Smelser
Paul Doty and *Dorothy Zinberg*
James S. Ackerman
Everett C. Hughes
Anthony G. Oettinger and *Nikki Zapol*
James S. Coleman
Norman Birnbaum
and *David Hawkins*

THE ANNALS

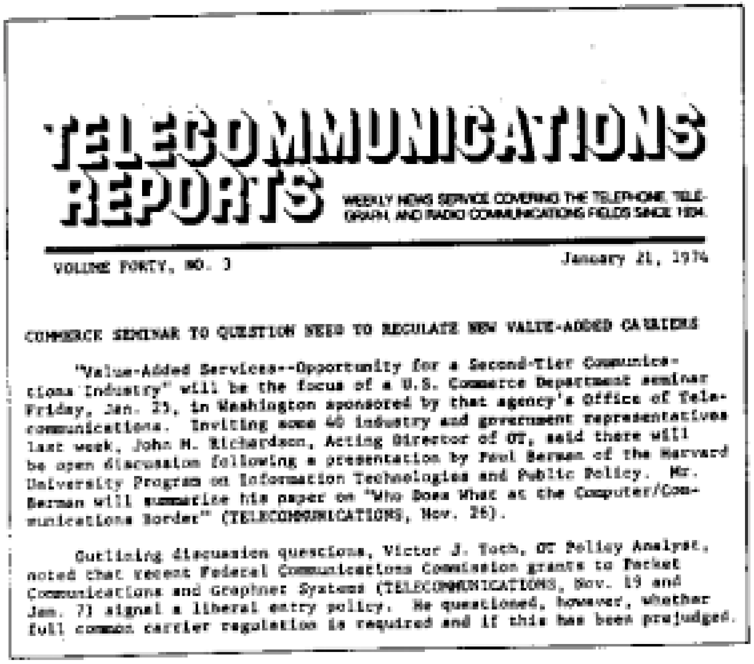
of The American Academy *of* Political
and Social Science

RICHARD D. LAMBERT, *Editor*
ALAN W. HESTON, *Assistant Editor*

THE INFORMATION REVOLUTION

Special Editor of This Volume
DONALD M. LAMBERTON
Professor of Economics
University of Queensland
St. Lucia, Queensland
Australia

Figure 5. Reaching Varied Publics—Through Diverse Publications



TELECOMMUNICATIONS REPORTS

WEEKLY NEWS SERVICE COVERING THE TELEPHONE, TELEGRAPH, AND RADIO COMMUNICATIONS FIELDS SINCE 1934.

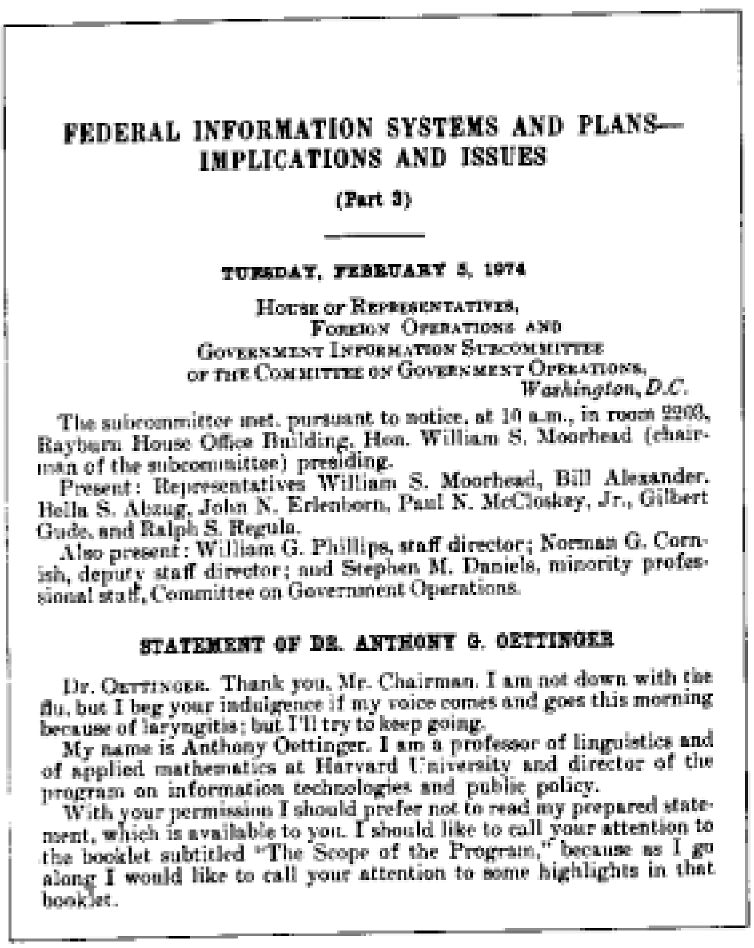
VOLUME FORTY, NO. 3 — January 21, 1974

COMMERCE SEMINAR TO QUESTION NEED TO REGULATE NEW VALUE-ADDED CARRIERS

"Value-Added Services--Opportunity for a Second-Tier Communications Industry" will be the focus of a U.S. Commerce Department seminar Friday, Jan. 25, in Washington sponsored by that agency's Office of Telecommunications. Inviting some 40 industry and government representatives last week, John M. Richardson, Acting Director of OT, said there will be open discussion following a presentation by Paul Berman of the Harvard University Program on Information Technologies and Public Policy. Mr. Berman will summarize his paper on "Who Does What at the Computer/Communications Border" (TELECOMMUNICATIONS, Nov. 26).

Outlining discussion questions, Victor J. Toth, OT Policy Analyst, noted that recent Federal Communications Commission grants to Packet Communications and Graphnet Systems (TELECOMMUNICATIONS, Nov. 19 and Jan. 7) signal a liberal entry policy. He questioned, however, whether full common carrier regulation is required and if this has been prejudged.

Figure 6. Reaching Varied Publics—Through Seminars



FEDERAL INFORMATION SYSTEMS AND PLANS—IMPLICATIONS AND ISSUES

(Part 3)

TUESDAY, FEBRUARY 5, 1974

House of Representatives,
Foreign Operations and
Government Information Subcommittee
of the Committee on Government Operations,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2203, Rayburn House Office Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representatives William S. Moorhead, Bill Alexander, Bella S. Abzug, John N. Erlenborn, Paul N. McCloskey, Jr., Gilbert Gude, and Ralph S. Regula.

Also present: William G. Phillips, staff director; Norman G. Cornish, deputy staff director; and Stephen M. Daniels, minority professional staff, Committee on Government Operations.

STATEMENT OF DR. ANTHONY G. OETTINGER

Dr. Oettinger. Thank you, Mr. Chairman. I am not down with the flu, but I beg your indulgence if my voice comes and goes this morning because of laryngitis; but I'll try to keep going.

My name is Anthony Oettinger. I am a professor of linguistics and of applied mathematics at Harvard University and director of the program on information technologies and public policy.

With your permission I should prefer not to read my prepared statement, which is available to you. I should like to call your attention to the booklet subtitled "The Scope of the Program," because as I go along I would like to call your attention to some highlights in that booklet.

Figure 7. Reaching Varied Publics—Through Congressional Testimony

between the Program and other Harvard scholars interested in the development of public policy.

Lynn most recently served as Assistant Secretary for Program Development and Budget in the Department of the Interior. He has also been Assistant Secretary of Health, Education and Welfare, Assistant for Programs on the Presidential National Security Affairs staff of Henry Kissinger, and Deputy Assistant Secretary of Defense.

The Program's on-campus relations also include regular presentations of our research findings to various University forums. (See page 20 for the Program's regular teaching activities.)

On December 10, 1973, the Director led a discussion of *A Perspective on the Nation's Information Resources* at the Program for Management Development at the Business School at the invitation of Richard F. Meyer, Professor of Business Administration.

Tony Oettinger's presentation to the journalists at Harvard as Nieman Fellows, *Lasers, Computers and the First Amendment,* on March 5, 1974, was recorded on tape. A transcript, with only a few expletives deleted, and no gaps, appears in the Spring/Summer 1974 issue of *Nieman Reports.* Oettinger was invited to make the presentation by James C. Thomson, Curator of the Nieman Fellowships.

Other presentations by Oettinger included:

Computer Science Colloquium on March 26, 1974, *A Perspective on the Nation's Information Resources,* summarized in the *Harvard Gazette*, March 29, 1974;

Cable TV as an Example of Technology Assessment, with Peter Shapiro, April 29, 1974 for Public Policy 282, *Science, Technology and Public Policy*, the course taught by Harvey Brooks, I. Bernard Cohen and Don K. Price.

Relations with Government Organizations

Contacts have been made with the staff of several government organizations now concerned with policy relevant to the uses of information technology. Individuals have commented on Program plans, reviewed relevant proposals, exchanged data or documents with the Program, participated in the Faculty Seminars, etc.

Such exchanges have taken place with the Assistant Secretary of Commerce for Science and Technology; the Bureau of International Scientific and Technical Affairs and the Bureau of Educational and Cultural Affairs of the Department of State; the Federal Communications Commission; the Foreign Operations and Government Information Subcommittee of the House Government Operations Committee; the Institute for Computer Sciences and Technology of the National Bureau of Standards; the National Science Foundation; the Office of Communications Programs of the National Aeronautics and Space Administration; the Office of Telecommunications in the Department of Commerce; the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary of the United States Senate; the White House Office of Telecommunications Policy; the National Technical Information Service; the Federal Reserve Bank; the National Commission on Libraries and Information Science; the Public Broadcasting Service; the Health Resources Administration; and the Offices of the following congressmen: Sen. Edward W. Brooke (R., Mass.); Rep. Jack Brooks (D., Tex.); Sen. Sam J. Ervin, Jr. (D., N.C.); Rep. Michael J. Harrington (D., Mass.); Sen. Philip A. Hart (D., Mich.); Sen. Frank E. Moss (D., Utah); Rep. Harley O. Staggers (D., W. Va.).

The Program launched a mailing campaign to make its results known to those groups in the government most concerned with decision making in its field. The annual reports and publication lists were sent to the chairman and staff personnel of congressional committees, and key personnel in the FCC and the bureaus. This mailing produced several responses indicating interest, and visits were made to solidify communication.

International Interchanges

"Our Shrinking World" has been a staple on the commencement speaker's shelf at least since Lindbergh, but that doesn't mean it isn't so. Very few of the Program's interests can be pursued in any depth without going beyond the borders of the United States. The computer and communications activities of the world are not unitary, but they are clearly intertwined. The Program this year has expanded its inquiries into the global situation and has established many active connections abroad. (See also page 16 above.) In April 1974, Kerstin Anér, a member of the Swedish Parliament, visited the Program for discussions of the impact of information technologies on rights of access to information and rights to privacy, in the context of the data law passed in Sweden in July 1973.

Harry S. Bloom, Senior Lecturer in Law and Director, Unit for Legal Research in Communications and Computers, University of Kent at Canterbury, led the Faculty Seminar of February 19, 1974 in a discussion *How the Law Treats Information.*

While a Visiting Professor, Tom Burns, Professor of Sociology at Edinburgh, Scotland, met with Program staff to discuss common interests in the structure of TV broadcasting organizations and to lay the groundwork for future information exchanges.

Petra Dorsch, of the University of Munich, Germany is visiting the Graduate School of Design in 1974-75. She is concerned with planning for communication in new towns, and expects to continue her research both in Germany and the United States.

Robert Hayes presented a faculty seminar on March 25 based on his paper *Europe's Computer Industry — Closer to the Brink.* (See publications list.)

Konrad Kalba visited Europe as a lecturer for the Department of State during May and June 1974. He spoke on cable television, video experimentation, and urban communications in Belgium, France and Germany.

A continuing exchange is taking place with Donald M. Lamberton, Professor of Economics, University of Queensland. Lamberton specializes in the economics of information, and edited the March 1974 issue of the *Annals of the American Academy of Political and Social Science* devoted to "The Information Revolution".

The Program was approached by the government of Mexico as one of a set of preliminary visits in a prospective nationwide communications planning effort.

Interchanges initiated in 1972 are continuing between the Program and Alex Reid, Director, Long Range Studies Division, Telecommunications Headquarters, British Post Office.

TEACHING 1973-74

4

Students in Harvard College and graduate students in the Schools of Arts and Sciences, Business, Government and Law have requested advice and guidance from Program participants. Some students

Figure 8. Reaching Varied Audiences—Through Public Lectures

PLANNING FOR URBAN COMMUNICATIONS
Planning 241
Fall
Mr. Kalba

The focus of this course is on the planning and development of urban communications systems, including their impact on urban economics, social service delivery, regional development, community politics, education, entertainment, and physical design. Students will be introduced to the technical, economic, regulatory, behavioral, political, and programming aspects of communications systems and will be asked to develop research projects on topics they are particularly interested in.

THE FRESHMAN SEMINAR PROGRAM 1974-1975

PROFESSOR ANTHONY G. OETTINGER will conduct a seminar open to students with school or job experience in newspapers, television, computers, telephone companies, libraries, publishing, brokerage firms, banks, or other information systems and who are concurrently enrolled in Economics 10 or Government 20. Background readings, biweekly discussions, and individual research projects will consider ongoing rapid changes in the information technologies and their scientific base; economic stakes in information systems; relations between the distribution of information and of power in a society; legal traditions of the information industries, with special reference to rights of free speech, rights to information, and rights of privacy; impacts on individuals and organizations; information systems as the "memory" or "nervous system" of society. Each individual research project will work up a specific characterization of one of these elements in a particular information system for comparison and discussion at seminar meetings and for development into a clear, concise paper. Promising research projects may be continued into the spring term.

Natural Sciences 130. Communication in Societies

Professors Anthony G. Oettinger and William H. Bossert

Explores the science and technology of communication among men, animals, and machines, and of its effects on social organization. Human speech, writing, and art and various examples of animal communication introduce a scientific analysis of the fundamental characteristics of communication systems and of their role in organizing societies. Analyzes contemporary problems attendant to the rapid spread of telecommunications and computers, shedding light on the interactions between information processing technology and society. The course itself is an experiment in communication through various new forms of educational technology.

Enrollment: Limited to 75.

Half course (fall term). Tu., Th., 2-3:30. 2069 (XVI, XVII)

Applied Mathematics 299r. Special Topics: The Data Processing Industry

Dr. Montgomery Phister, Jr.

Surveys the data processing industry, showing how economic and technological factors have interacted to sustain its development and growth. Discusses current industry problems in the light of these factors. Catalogues and describes: the growth and present status of various subindustries; trends in the price and performance of products and services; past and present markets, based on a review of the costs and benefits of using computers, and the economics of alternative ways of processing data; trends of costs (as distinguished from prices) in the industry, and analysis of the factors which determine costs; selected companies, with emphasis on the influence of business decisions on the structure and performance of the industry. Based on readings and field visits, students analyze selected aspects or problems of the data processing industry.

Half course (fall term). M., 2-4. 1434 (VII, VIII)

Public Policy 283b. Seminar: Information Technologies and Public Policy

Professor Anthony G. Oettinger and Mr. William M. Capron, with Professors John R. Meyer and Arthur R. Miller, and other participants in the Program on Information Technologies and Public Policy

Public policy issues about the evolving role of information technologies (including telecommunications and computers) at all levels of government. Emphasis on the allocation of national information functions among available technologies and associated institutions (book libraries, schools, broadcast or cable TV, telephone, etc.); impact on individuals, organizations, and public policymaking; the allocative roles of public and private interests. Student development of historical or contemporary case studies on specific application areas or technologies.

Half course (spring term). Th, 3-5. 0694 (XVII, XVIII)

Figure 9. Reaching Varied Publics—Through Teaching

have sought guidance on particular projects, others are interested in including information technology and public policy into their study plans. Among these, Paul Berman, Richard Berner, Paul DiMaggio, Roger Kvam, Warren Lavey, Elizabeth Lazarus, Vincent Mosco, Daniel Prives, David Russell and David Seipp, are participating in Program research (Section 2).

Student interest in the Program coincides with a general rise of interest in the area of science, technology and public policy as reflected by increasing numbers of students seeking degrees in special concentrations in the area. A consulting committee for the Committee on Degrees in Special Concentrations was created in June 1974 to advise these students. The Committee, chaired by Harvey Brooks, Dean of Engineering and Applied Physics, includes James N. Butler, Professor of Applied Chemistry; William M. Capron; I. Bernard Cohen, Professor of the History of Science; Robert Dorfman, Professor of Political Economy and Anthony G. Oettinger. To aid in advising students, the Program maintains a listing of related courses throughout the University and refers students to faculty members who can help them with independent study in specialized areas.

Five courses (Figure 9) are closely associated with the Program in both subject matter and participating faculty. Freshman seminars are one way in which Harvard College gives undergraduates an early opportunity to get first-hand research experience and to establish closer relations with faculty than is possible in the larger lecture courses making up the bulk of undergraduate fare. One graduate seminar is part of the offerings of the Public Policy program of the Kennedy School of Government; the other is given in the Department of City and Regional Planning of the School of Design.

The course on the data processing industry is a one-time offering of the Program in conjunction with the Center for Research in Computing Technology of the Division of Engineering and Applied Physics. It will be taught by Montgomery Phister, Jr., who will be visiting Harvard during the 1974 fall semester. Phister, with twenty years of experience in computer technology ranging from a Ph.D under Maurice Wilkes at Cambridge University in 1953 to his most recent position as Vice President and Manager of the Computer Development Division, Xerox Data Systems, is completing a book on the subject of the course.

Communication in Societies is an experimental course in substance, format and technique. During 1973-74 the Program, with project support from Bell Laboratories, undertook a formal evaluation to complement informal evaluations developed annually while the experiment was supported by the National Science Foundation.

The aim is to assess one aspect of the outcome, by comparing knowledge and attitudes of people who took the course during the last four years with those of people who expressed an interest in it but did not, for one reason or another, enroll.

A questionnaire, prepared in collaboration with Ernst Z. Rothkopf, Head, Learning and Instruction Research Department at Bell Laboratories, was mailed to 650 participating and non-participating students in July 1974. Returns are being analyzed at Bell Laboratories, using multidimensional scaling techniques developed there.

The cross-fertilization between research and teaching activities is evident from the overlap between Program participants and faculty responsible for these courses. In addition, Carol Weinhaus has assisted in *Communication in Societies* for the last three years, most notably by taking charge of the video facilities and by supervising students' video experiments. Paul Berman and Daniel Prives became interested in research in the Program's field as students in the course and later, along with Nikki Zapol, served as Teaching Assistants or Fellows. Elizabeth Lazarus and David Seipp are the most recent course alumni to participate in Program research.

CORPORATE AFFILIATION DRIVE 1973-74

5

The Program launched and maintained a drive to acquire affiliates outside the University in the past year. The drive was directed at individuals, government, and corporations, with a concentration on the latter. There were two purposes to the drive, to provide ongoing support for the core program, and to open communications between the Program and companies in the information industries or served by them.

The avenues of communication were sought for a number of specific purposes, although other purposes sometimes made a serendipitous appearance. We wanted more affiliates to review research proposals and make suggestions at the formative stage. This would considerably broaden our pool of possible project reviewers. The project reviewers serve as an intellectual board of directors for each project.

We also hoped to tap new supplies of data, much of which is available only from corporations and government agencies and legislative bodies. We also hoped to attract new ideas for research and funds to support them.

Further, we sought possibilities for joint ventures, such as that being considered with Arthur D. Little, Inc. as described in the research section.

We hoped to find new outlets for dissemination of the Program's research to government groups, individuals, and corporations who can use the results.

We sent letters of solicitation to domestic and foreign corporations. Several individuals with strong corporate contacts who knew the Program well were apprised of the drive and asked to assist.

The concrete growth of the Program and its increasing understanding of its task of illuminating and defining the public policy issues in the information industries made our approaches considerably easier, as we were better able to distinguish between our work and both the work of consultants and of academic theorists.

The outcome of the affiliation drive was satisfactory on all counts, but room for growth remains and the drive continues.

Some annual money was raised for the core program, but more funds are needed to assure continuity in our work.

There was a very gratifying response on the substance of the Program. Many firms assured us that the direction we are taking is relevant and the fundamental insights and questions on track. Many offered to participate and several new research topics were suggested.

Other results of the drive included:

An endowment by the IBM Corporation for studies in technology and society will cover half of Professor Oettinger's tenured chair, formerly divided between linguistics and applied mathematics.

The Encyclopaedia Britannica requested a contribution on information goods and services to run as one of two features in its 1975 yearbook, juxtaposed to an article on world food supplies.

The Mobil Oil Corporation has suggested a working conference on operational difficulties in world-wide communications. A conference in this area is currently being considered with the participation of the First National City Bank, General Electric Company (an affiliated corporation), International Business Machines Corporation, Mobil Oil Corporation, Pan American World Airways, Inc., RCA Global Communications and Standard Oil Company (Indiana).

FINANCIAL STRUCTURE

6

The backbone of the Program is its set of research projects. Each major research project is separately funded by outside sources. The Program arranges for the funding, but funds no major projects on its own.

Certain *core* Program activities, however, must be supported through general funding from within the University or outside. The major function of the core is setting and sustaining the course of the rest of the Program.

These core activities are in three areas: Program planning, direction, and administration; communication; and teaching.

Planning, direction, and administration covers the obvious activities (see page 3) plus development of new programs for project funding, supporting small unfunded studies, and research guidance, which includes referral of research questions to the faculty. Also under this heading comes keeping track of research and preliminary efforts at synthesis.

Communication includes:

- Faculty seminars
- Research proposal review
- Publication and other communication of results to the public and policy makers
- Network of Program affiliates
- Program advisory committee
- Bibliography and library

Under *teaching* comes not only the Program's courses and seminars, but also stimulation of research by undergraduates and graduate students, advising faculty members with courses falling within the Program's scope, advising students on courses and degree programs within the field, and assessing periodically the need for added degree programs.

All of these activities may overlap; each serves several functions. The primary aim of all these core activities is breadth and coherence in our work and regularizing this new field of research.

Not all core Program activities require general financial support. The Program has conducted one institute that paid for itself. It is expected that most future institutes and conferences will also support themselves or be funded as distinct projects.

Money for salaries and support of Program-affiliated Harvard Faculty active in the teaching program is a major University contribution to general Program support.

General funding from outside sources is therefore used primarily for research planning and for much of the Communication program, key elements in lending the Program breadth and coherence, independence and responsiveness.

It is planned to support the core Program through contributions from the affiliates and appropriate charges to research projects.

Additional details of financial planning are given in the *Discussion Paper on Program Funding* listed on page 30.

APPENDICES

Appendix A: The Faculty Seminars — 1972/73

October 19	*The ARPA Network:* Thomas Cheatham, Gordon McKay Professor of Computer Science, Center for Research in Computing Technology
November 2	*Transportation and Telecommunications:* Paul Cherington, James J. Hill Professor of Transportation, Business School
November 16	*The Importance of Information in Economics:* Michael Spence, Assistant Professor of Political Economy, School of Government
December 14	*Information Technologies and Copyright:* Stephen Breyer, Professor of Law, Law School
January 8	*FCC Regulatory Policies at the Interfaces:* Hyman Goldin, Professor of Communications, Boston University; Member, Massachusetts CATV Commission; Former Chief, Economics Division, FCC
January 22	*The Impact of Information Technologies on Organizations:* Chris Argyris, James Bryant Conant Professor of Education and Organizational Behavior, School of Education and Business School
January 29	*Information Markets and the Value of Information:* Daniel Prives, '73 Harvard College
February 5	*Transportation Policy at the Interfaces:* Paul Cherington, James J. Hill Professor of Transportation, Business School
February 15	*Urban Cable Communications: Defining a Planning Process:* Konrad K. Kalba, Instructor in City Planning, Graduate School of Design
February 22	*New Information Technology and Health Care Delivery Policy and Institutional Alternatives for the Development of CATV:* William Capron, Lecturer on Political Economy and Associate Dean, School of Government
March 1	*Aids to the Delivery of Ambulatory Medical Care:* Barney Reiffen, Principal Associate in Medicine, Medical School, and Assistant to the Dean, School of Public Health
March 8	*Assimilation of Communication Technology in the United States and Other Advanced Countries:* James L. McKenney, Professor of Business Administration, Business School
March 15	*Analysis of Dynamic Structuring of the Communications Industry: Processes of Allocation of Functions to Competing Enterprises:* Peter Shapiro, Research Fellow in Information Technologies and Public Policy
April 12	*Exploring Constitutive Rationality: Case Studies in Information Technologies:* Laurence H. Tribe, Professor of Law, Law School
April 19	*Determinants of Investor Decision: A Case Study of the Cable Television Stocks:* Wallace P. Wormley, Graduate School of Arts and Sciences
May 3	*Policy Issues in Computer Network Development:* Paul Berman, Law School
	Cable Television: Richard Berner, '74 Harvard College
May 10	*Information Technology and Individual Access: Economic and Regulatory Aspects:* Lee L. Selwyn, Assistant Professor, College of Business Administration, Boston University

Appendix B: Program Review Procedures and Guidelines

The availability of an otherwise unrestricted *planning* grant from the Markle Foundation has enabled the Program to evolve distinctive practices in developing proposals for project funding.

These practices are vital to the independence of the Program and to the objectivity of its responsiveness to the interests of the public and to the needs of policy makers.

Participants in the Faculty Seminar, other Program participants, including individual and corporate affiliates, and Program administration suggest ideas for research, develop proposals for funding or undertake exploratory work.

Each project is submitted, in the first instance, to the test of consonance with the aims of the Program.

The dangers of hopeless diffusion are discussed on page 26.

The line between proposal writing and project work is drawn very conservatively. Preparing a proposal generally entails acquiring additional knowledge, especially if the work is to be done with the breadth of competence called for by Program strategy. Such acquisition is usually indistinguishable from the early stages of research. Except for the deadlines imposed by requests for proposals, there is rarely a clearcut place to draw the line between proposal writing and project performance. To develop high quality proposals germane to the Program, addressed to significant policy questions but based on independent and varied judgments, the Program devotes an unusual proportion of effort to proposal preparation.

Each project undergoes a rigorous reviewing process in moving from a gleam-in-the-eye toward a proposal for funding.

This process has proved crucial to forging effective links among universes of discourse. Jargon, implicit or unchallenged assumptions, parochial outlooks, axe-grinding, methodological quirks, ignorance of germane theories, facts or standpoints that are commonplace to someone else have all been among the targets of specific and ultimately very constructive criticisms.

The process is time-consuming, and occasionally ego-bruising, but it has proven thoroughly worthwhile in terms of quality as judged by critics, victims, Program administration and, most important, the Program's various publics.

1. Proposal Review and Submission

Wherever projects originate in the Program, they go through the following steps, any of which may lead to redirection or termination:

- An initial project description is reviewed by the Program director and associate director, who usually request the opinions of qualified faculty or outside participants.
- The author prepares a brief draft which is mailed to participants prior to presentation and review at a Faculty Seminar.

- Taking the seminar into account, the author revises the draft into a pre-proposal. This new draft in turn is reviewed by the Program staff and may be returned to the author for further revision.
- The draft is then formally circulated to reviewers associated with the Program. These reviewers, selected either for their knowledge of the work itself or of the intended use of its products, include specialists and generalists from both within the University and outside. Their instructions are reproduced on this and following pages.

The results have been encouraging. Almost all invited reviewers respond with serious, critical and comprehensive commentaries. They frequently raise substantive issues, draw attention to problems of clarity or emphasis and supply links to other efforts outside the author's universe of discourse. Such criticism typically triggers a major revision, often based on personal consultation with reviewers or on readings they suggested.

The final version contains a statement of required resources and a draft budget; it is submitted to prospective funding sources as a draft proposal, requesting comments.

The decision to submit formally a proposal for funding is made by the Program Director with the advice of the Policy Committee (described in Appendix C).

Once funded, each project will have a Project Review Committee (Appendix C) similar in composition to the original group of reviewers, but formally charged with watching over the project.

2. Research Review Conference

Projects of sufficient size include a budget item for a "review conference" to convene once a draft report is available. The conference will include project members, members of the Project Review Committee (Appendix C), representatives of policy-making groups and others likely to be represented in the report. This conference at the drafting stage will involve representatives of the report's intended audience at a time and in a manner likely to ensure an intelligible, objective and useful report. No such conference has yet taken place. However, smaller prototype conferences have been held on several smaller projects.

3. Guidelines for the Review of Program Proposals and Reports

Review groups combine educated and well-informed laymen and experts.

They serve as "intellectual boards of directors" and aim to:

- enable projects to pass muster in all disciplines and enterprises they touch on;
- help find pertinent collaborators and data;
- provide quality control;
- redirect or abort projects when necessary.

The reviewing process should avoid second-guessing authors or substituting the views of the reviewers for those of the authors. Reviewers can press their views as strongly as they wish, but they must bear in mind that the authors take the final responsibility for their product and therefore are entitled to treat what the reviewers say as advisory only.

The organization and procedures of the review will in each case be worked out by the Program Director in consultation with the reviewing group and the authors. Reviewing should be done, or at least begun, well before the final draft. Also, experience has shown that at least one meeting between the authors and the reviewers is very desirable.

Matters of purely stylistic editing are most efficiently dealt with at the time of editing of the final draft. Thus this need not seriously concern the review group.

The key questions that reviewers should bear in mind are as *follows:*

a. When reading proposal drafts:

1. Is the context of the proposal clearly described?
2. Are tasks and products explicitly defined in the proposal?
3. Are resources specified in the proposal consonant with the tasks?
4. Is the proposed budget realistic?

b. When reading report drafts:

5. Is the report clear and concise?
6. Is the report convincing?
7. Is the report complete?
8. Is the report fair?
9. Could a conflict of interest harm the report?

a. Proposals

Is the context of the proposal clearly described?

Are the current policy issues or the gaps in our knowledge to which the proposal is addressed clearly specified? Are the assumptions on which the work will be based stated explicitly? Is there concrete evidence of the basis in existing knowledge on which the proposed work will build? Is there satisfactory evidence that related or similar research efforts are known to the investigators? Is a solid case made for the need for the work? Is the work consistent with the goals of the Program on Information Technologies and Public Policy? Does the work naturally match the interests of any prospective sponsors? Could the work be done at least as well elsewhere? Are the audiences for the work (and the expected value of the work to these audiences) clearly identified?

Are tasks and products explicitly defined in the proposal?

Is the work organized? Are tasks spelled out enough to provide clear guidance to those who will be carrying them out? Are clearly identifiable products specified for each task? Is a procedure for further defining a subsequent phase and for deciding whether or not to undertake it clearly specified as a task in the preceding phase?

Are resources specified in the proposal consonant with the tasks?

Are the resources of Harvard University and of the Program on Information Technology and Public Policy appropriate to the tasks? Is there a clear, adequate commitment of qualified faculty and Program administration time to the tasks? Is there a reasonable plan for recruiting talents not already in place and committed to the tasks? Is there reasonable assurance that proposed information sources are adequate and accessible enough to assure a solid factual base for the work in each task?

Is the proposed budget realistic?

Can all tasks in the first phase be completed within specified time and dollar budgets? Is there a reasonable allowance for detailing subsequent phases?

b. Reports

Is the report clear and concise?

Are the arguments and expositions intelligible to the intended audience? Is the style of the report consistent throughout or, if not, is there a good reason? Are there statements that are ambiguous or may be misunderstood? Are technical terms explained? Do figures and tables support inferences made from them? Does each figure or table have a function? Are additional figures or tables needed? Are the style and organization adequate?

Is the report convincing?

Are the arguments likely to be convincing to the non-specialist? Has a thorough effort been made to marshal reliable data? If there as strong or extreme statements, are they adequately supported and documented? Are there arguments that should be recast and made more cogent? Are there illogical or incomplete arguments? In short, do the authors make a good case for their views from the standpoint of a less involved or committed audience?

Is it complete?

Are important relevant points omitted? Are some topics slighted and others overemphasized? If so, does this bias the report?

Is it fair?

Are the viewpoints of others fairly presented? If there are strong criticisms of institutions or individuals, are they adequately documented? If a policy or action is attacked, is the policy in question fully understood or described? If a highly novel and not generally accepted viewpoint is expressed, is it identified as such?

Conflict of interest?

Is there material that is likely to appear as excessive special pleading? Are recommendations being made for expenditure of funds that will benefit institutions (including Harvard University) with which the authors are connected?

c. Conclusion

Virtually none of the questions listed above elicits simple answers. Exercise of sensitive judgment is essential. The authors should be given the benefit of the doubt unless the possibility exists that the report will not creditably represent the writers or the Program on Information Technology and Public Policy.

It is requested that the review group inform the Program Director of its conslusions.

Appendix C: Administrative Structure

1. Administration

Advisory Committee. The Advisory Committee shall:

a. have members from outside the University, from the United States or abroad, including governments at all levels, industry, commerce, other academic institutions and public-spirited citizens.

b. advise the Policy Committee and the Program Director on all facets of the Program.
c. meet with the Policy Committee at least once a year.
d. report annually to the President of the University on the Program.

Policy Committee. The Policy Committee shall:

a. include representatives of every Faculty of the University with a substantial interest in Information Technologies and Public Policy. The Program Director shall be a member *ex officio,* but not chairman of the Committee.
b. recommend to the Governing Boards of the University a permanent member of a Faculty for appointment to a limited term as Program Director.
c. submit all internal budget recommendations and outside proposals in the name of the Program.
d. review and redefine the role of the Faculty Seminar and initiate other Program activities as appropriate.
e. periodically assess the need or demand for degree programs.
f. give policy guidance to the Program Director.

2. Standing Committees

As the Program takes shape, and particulary as research projects are funded and launched, a formal committee structure will be needed. Otherwise, the burden on the members of the Policy Committee can easily become excessive. The following suggests one pattern toward which we might move. During the evolutionary phase the Policy Committee, on the recommendation of the Program Director, could establish committees on finance, human resources, plans and on communications and liaison, perhaps in the first instance as *ad hoc* subcommittees of the Policy Committee. Of the suggested committees, the most immediate need is an executive committee.

Executive Committee

The Executive Committee shall consist of the Program Director (chairman), another member of the Policy Committee and at least one other Program participant. The Executive Committee will act in behalf of the Program and will be the principal instrument for tying together all Program activities, within the guidelines of the Policy Committee.

3. Ad Hoc Committees

Project Review Committees

A review committee for a project shall review the detailed work and drafts of reports or other products. The committee shall be appointed early in the life of a project and be responsible for evaluating the work of a project and its results in behalf of the Program.

Project Advisory Committee

An advisory committee for a project shall bring to bear on the project advice from disciplines complementing those of project personnel, significant viewpoints from within and without the University and in general help supply the context within which a project is conducted. The committee shall assist with the development of the project proposal and thereafter.

Appendix D: Managing for Breadth and Coherence

Breadth and Coherence

The Program's strategies are aimed at bringing a new field of study to order. To do so, we have met diversity with diversity. We have sought to develop the closest cooperation among specialists and generalists of the most varied kinds from inside and outside the university, from government and industry. The problem which is caused by this kind of breadth is one of coherence.

A specific administrative approach implementing this strategy appears to be working effectively, although complete confidence is premature.

Rather than bringing together

persons of different capabilities with an equal managerial responsibility, the approach has brought together persons with equal intellectual responsibliity, but with *project management centralized* in the project director. His work, both in the proposal stage and in the project stage, is subject to regular review by representatives of relevant academic disciplines and other specialists and generalists.

An analogous practice applies to the Program itself. Program administration is subject to ongoing review by an interdisciplinary *Executive Committee*, guided by a *Policy Committee* consisting of the deans of the major Harvard faculties or their representatives, and advised by the still-informal Program Advisory Committee. See Appendix C for further details.

Further protection against chaos is provided through the work of the core Program, as described in the Introduction.

On a less lofty plane, it is a point of philosophy with the Program to bring together people working in overlapping research areas for regular discussions. This can consist of an occasional lunch among the principal investigators in one case to continuous staff interchange and joint writing efforts in another. In its various manifestations this is called the "cluster concept".

There are other concerns arising from the research style of the Program and the institutional barriers between various actors and factors in the making of information policy.

Priorities

Attempting to set and enforce research priorities in the manner of strong line organizations runs counter to the grain of Harvard's strength. The Harvard environment encourages intellectual autonomy and the faculty are accustomed to full freedom in choosing research topics. Indeed, the University cannot be true to its distinctive role if the faculty fail to set their own terms of intellectual trade. Hence, if Program administration overspecifies research questions and their priorities, they will largely be ignored. But without structure or priorities, breadth lapses into an empty slogan since the necessary coherence and depth are unattainable.

The common sense of priorities manifest in the emergence of the cluster of projects on broadband telecommunications services may well recur for other topics, but the accidental nature of the event and the shrinkage of the cluster reveal the frailty of such a process.

The collaboratively written *An Evolving Framework for the Program on Information Technologies and Public Policy* and its distillation into portions of the companion to this booklet are the the first products of a more deliberate approach to a balance between overspecification and underspecification of scope and priorities. The scope of Program interests provides a test of consonance with Program aims, and a framework for suggesting and eventually pulling together diverse individual strands of research, while leaving ample room for individual choice of specific subject, method and emphasis.

Commitment

A special commitment problem arises for each level of the academic hierarchy.

Many tenured faculty have expressed enthusiasm for the Program and its aims, but are too busy to undertake additional work until they have met present commitments. Beginning dates may run two years into the future. In order to attract commitments by senior faculty, the Program must demonstrate a potential for long-term stability.

Junior faculty and graduate students have more time, but they are more constrained than their seniors to working within their disciplines along established doctrinal lines. Deviation can be a hazard to promotion or to approval of a thesis, if only because the quality of work is more difficult to judge. One excellent prospect, a graduate student, had to pull back from the Program in order to make his thesis conform more strictly to the scope of his department.

Undergraduates generally have the widest latitude, but only the most outstanding and mature of them are capable of contributing to Program research in addition to drawing on its teaching resources.

Narrowness

Not unexpectedly, there is a tendency for every Program participant to cling not only to the strengths of his home discipline or profession but also to the comforts and priorities of his accustomed universe of discourse. Constant effort, good will and patience on all parts are therefore necessary to nurture breadth and coherence into a stable way of life. Various techniques addressed to this problem have been described throughout this booklet. There is progress, but addressing this problem has continuing high priority.

The breadth of understanding required of principal investigators has raised insurmountable problems for some. They must be able to accommodate themselves to constant assimilation and synthesis of material from other fields than their own. Not every candidate has proven capable, but enough have done so to constitute a viable group of researchers.

This problem also has an external manifestation.

Because Program proposals are interdisciplinary, they can be evaluated properly only by interdisciplinary teams. Few funding sources ordinarily have such a mechanism, yet individuals, however capable, will not know whether work outside their field is meaningful or nonsensical, competent or incompetent. At the very least, therefore, finding money for Program research projects will be a more tedious and exacting task for all concerned than it is with more traditionally defined programs.

Privileged Information

Much of what the Program is interested in is happening inside government agencies or private firms in the information/communications/computer industries and some organizations prefer to keep it that way. In most cases, however, organizations have been willing to share information and material with the Program. We have worked out with these organizations a system to protect privileged material without hampering research and publication, but some important data remain beyond our reach.

Long Gestation

The Program's research projects usually have a long gestation period. This is due in part to the Program's insistence on setting standards for research that are both broad and high and on using its review procedures while defining a research project. An external cause of the problem, however, is the tendency of senior Harvard faculty to be booked up in advance. Thus, the Program must catch and keep the interest of such people for periods of two years or more between the initial contact and the time the professor's calendar is cleared.

This problem is part of a vicious circle: In order to attract funding, the Program must have some completed research to show after a year or two; in order to hold the interest of senior faculty, the Program must remain in existence for another two or three years before their work can begin; the Program must complete research to attract funding to hold the fort until senior researchers can join us.

The Program has managed to break this circle in some cases through use of alternative forms of research and through vigorous fundraising.

Papers Available from the Program on Information Technologies and Public Policy As of October 1974

The following documents are available from the Program Office, 200 Aiken Computation Laboratory, Harvard University, Cambridge, Mass., 02138. Telephone: 617 495-3986. Simply send a letter or purchase order requesting the copies desired.

Title	Date	Copies at		Total
Constraints on the Regulatory Process: A Case Study of Regulation of Cable Television — Richard Berner	Oct 1974	______	$6.50	______

What forces shape the FCC's cable regulatory process? The paper presents a detailed analysis of the industry groups' "consensus agreement", which successfully altered the Commission's choice of cable regulations, and of the Cable Bureau's role in enforcing these regulations with a direction and purpose distinguishable from the Commission as a whole.

Title	Date	Copies at		Total
Toward a Theory of Legislative Compromise: Sharp or Shaded Information and the Generation of Options — Kurt Borchardt	Sept 1974	______	$2.25	______

Discusses functions of legislative compromises and the processes by which they are reached, with many examples from Congressional proceedings. Suggests a framework for devising a theory of legislative compromise. (This publication appeared in an earlier draft version under the title: "One Aspect of Public Policy Formation: Devising Compromise Proposals in Public Policy Conflicts.")

Title	Date	Copies at		Total
Information Technologies and Control over Learning —Paul DiMaggio and Nikki Zapol	Sept 1974	______	$5.00	______

Outline of project for analyzing the patterns of control over information flow to learners via both traditional textbooks and broadcast video to determine — and, if possible, explain — differences and similarities and their likely impact on individuals and on society.

Title	Date	Copies at		Total
Public Policy as a Determinant of Market Structure: The Case of the Specialized Communications Market — Peter D. Shapiro	Sept 1974	______	$4.75	______

How public policy actions interact with other factors in the structuring of the specialized communications market: Hypotheses and preliminary findings.

Europe's Computer Industry: Closer to the Brink
— Robert H. Hayes

An essay on the competitive status of the European computer industry and its options for the future.
A copy of this paper may be obtained from the *Columbia Journal of World Business*, 408 Uris Hall, Columbia University, New York, New York 10027. Vol. 9, No. 2, Summer 1974, price $1.50.

Title	Date	Copies at		Total
Computer or Communications? Allocation of Functions and the Role of the Federal Communications Commission —Paul J. Berman	May 1974	______	$2.25	____

Interaction between new offerings combining computer and communication technologies and old legal doctrines leads to evaluation of the scope of the concept of communications common carriage with resulting impact on the jurisdiction of FCC and policy options available to deal with these new offerings. (This publication appeared in an earlier draft form under the title: Who Does What at the Computer/Communications Border: Allocation of Functions and the Role of the FCC." The present version is the result of significant revisions of Draft 1.) This paper is also available through the National Technical Information Service, No. PB-235 146/AS.

Toward A Quantification of the Information/Communication Industries — Warren G. Lavey	May 1974	______	$3.00	____

A rough census of the information industries; preliminary attempts at comparison are made. (This publication appeared in an earlier, less complete version under the title "Statistical Overview of the Information/Communication Industry".) This paper is available through the National Technical Information Service, No.PB-232 648/AS.

City Meets the Cable: A Case Study of Cincinnati's Decision Process — Kas Kalba	May 1974	______	$3.50	____

A case study of the cable TV decision process (well known for its high level of citizen participation) in Cincinnati. Some planning and policy implications of the findings are explored.

A Review of Edward M. Dickson, in association with Raymond Bowers, *The Video Telephone, A New Era in Telecommunications, a Preliminary Technology Assessment* —A. G. Oettinger and P. D. Shapiro	Feb 1974	______	$ .85	____

A critical review of facts, assumptions and speculations found in Dickson and Bowers' assessment of the video telephone. This paper is available through the National Technical Information Service, No. PB-235 145/AS.

Discussion Paper on Program Funding	Feb 1974	______	$ .75	____

A paper discussing funding strategies and their relation to the Program's goals and structure.

Title	Date	Copies at		Total
The TelePrompTer Syndrome and Its Aftermath — Will Cable Realize Its Promise? —Anne W. Branscomb	Feb 1974	____	$1.50	____
Analyzes the policy implications of TelePrompTer Corporation's financial crisis in terms of investment potential, personnel practices, programming and other services, and regulatory patterns. Available also through the National Technical Information Service, No. PB-232 334/AS.				
Bibliographic Tools	Jan 1974	____	$1.75	____
A draft guide to reference books, monographs, journals and other literature for use by students and Program staff.				
A Perspective on the Nation's Information Resources, *Scope of the Program* —(Annual Report 1972-73)	Jan 1974	____	$3.00	____
Preliminary description of the field and definition of the Program's objectives				
A Perspective on the Nation's Information Resources, *The Year in Review* —(Annual Report 1972-73)	Jan 1974	____	$3.00	____
Description of steps toward goals described in "Scope" taken by the Program to September 1973.				
An Evolving Framework for the Program on Information Technologies and Public Policy	Oct 1973	____	$8.00	____
A draft in outline form of a definition of the scope of the Program, with guides to the literature germane to outline headings.				
Structure-Determinants of Communications Markets: The Interplay of Public Policy with Other Factors —Peter D. Shapiro	Aug 1973	____	$1.50	____
Proposal to study the interplay among and relative significance of policy, firm strategy, technology, marketplace, and financing in the private-line/switched-data sector of the communications industries.				
City Meets the Cable: Planning Approaches to Urban Communications Technology —Kas Kalba	June 1973	____	$1.50	____
A proposal to study the cable decision process in three cities.				
Prospectus	Sept 1972	____	$2.75	____
An initial description of the Program's perceptions, goals and plans.				

Title	Date	Copies at		Total
Will Information Technologies Help Learning? —A. G. Oettinger and Nikki Zapol	Sept 1972	______	$1.75	_____

How to meet the varied learning needs of people of all ages is a burning question of public policy. In the past two decades faith in advanced technology as an answer peaked, then receded. The question remains and so does the potential of technology. The paper analyzes the scientific, technological and economic limitations on the effectiveness of information technologies, and describes the impact on this effectiveness of policy issues in areas outside the "ed biz" — broadcasting, libraries, postal services, publishers and others.

In addition, notes were taken at the Faculty Seminars, and tape recordings were made of most of them. These are too informal to merit inclusion on any list of Program products. However, if any of the seminars listed on pages 14 and 23 of this booklet, seem to be of special interest, we will deliver available notes or papers for the cost of reproduction.

Mailing address for National Technical Information Service: U.S. Department of Commerce, Springfield, Virginia 22151

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