A Perspective on the Nation's Information Resources

Program on
Information Technologies
and Public Policy

Harvard University
Cambridge, Massachusetts

The Program
Year in Review
1972-1973

A PERSPECTIVE ON THE NATION'S INFORMATION RESOURCES

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1972-1973

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1972-1973

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

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	$ billions	
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Cable television	0.4	
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Telephone	18.2	FCC-regulated
Telegraph	0.4	
Specialized common carriers		
Satellite carriers		
Mobile radio systems		
Motion pictures	4.5	
Organized sports, theatres, churches, etc.		
Computer software suppliers	2.1	
Computer service suppliers		
Postal service	6.8	
Private information delivery services		
Newspapers; wire services	7.4	
Periodicals (including newsletters)	3.2	
Business information services (including opinion surveys)		
Advertising		
Marketing		
Brokerage industries		
Book publishing and printing	3.7	
Libraries		
Schooling		
Research and development		
Federal information institutions		
Census Bureau		
National intelligence community		
National Technical Information Service		
Social Security Administration		
County agents		
etc.		
Banking		
Insurance		
Securities		
Legal services		
GNP (1971):	974	

Figure 1. Approximate gross revenues (1970-1971)

This is a rough and still incomplete census of the information industries, including comparable revenue figures gathered to date. The industries enclosed by the bracket are regulated by the Federal Communications Commission. Information policy is in particular ferment in this area, which has been the first object of the Program's attention. The figures are drawn from a Program Working Paper prepared by Warren G. Lavey. Double counting has not been eliminated.

1

This booklet reports on the details of the research, teaching, and communications activities of the Program on Information Technologies and Public Policy in its first year. It gives full background information on the Program's means of setting priorities, its administration and its finance.

The intentions and expectations of the Program are best understood through reading a companion booklet subtitled *The Scope of the Program*. 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. It is also clear, however, that information is a very different kind of commodity, one that does not warm us or shield us from the elements, but rather one that fills our heads and the memories of computers.

It is the Program's thesis that 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.

The strategies adopted by

the Program toward these ends include

- striving toward intellectual breadth as well as depth
- developing a framework to support coherent synthesis
- specifying policy options and their likely effects on the public
- aiming toward publications intelligible to the general public as well as to scholars
- seeking, from multiple private and public sources, a balance between general funding and project funding.

Report Summary

The remainder of this booklet briefly recapitulates the early history of the Program, then describes and evaluates the start-up period from early in 1972 to August 31, 1973.[1]

Program activities are grouped for convenience under three headings: research, communication and teaching. These categories are not, however, mutually exclusive. For example, the Faculty Seminar described under the communication program also plays an essential role in research.

The Research Program is to be the backbone of Program activities. It addresses, through specific projects, the broad questions the Program is asking. However initiated, research ideas are screened for appropriateness to the Program and for quality. The year's research is detailed on page 5.

The Communication Program serves to keep participants up-to-date through intellectual and social interchange. Two other functions are also intended. The first is to establish and maintain mutually comprehending discourse among varied specialists

and generalists and to develop a coherent view of information industries and technologies as described in sections 3 and 4 of the companion booklet. Second, the Program aims to communicate its findings and its analyses of options and their likely effects to a broad public and to elicit from outside a flow of inputs to research. The year's communications work is described on page 7.

The Teaching Program aims to increase the capability of students to integrate ideas and facts from disparate sources and enable them to develop an understanding of the processes whereby public information policy issues are resolved. The teaching program is described on page 9.

Administration of the Program aims to provide a common framework and compatible priorities for participants without damping individual initiatives and to establish a climate where mutual support and criticism help assure coherence, quality and objectivity. Administrative procedures are illustrated throughout this booklet; the administrative structure of the Program is described on page 9.

Finance of the Program strives for balance and diversity by seeking distinctive funding for research projects and for the core Program activities listed in the finance section, page 10.

The special problems of achieving *breadth and coherence, other problem areas, and emerging strengths of the Program* are discussed in the concluding sections.

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.

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[1] Readers interested in additional details on the evolution of the Program are invited to use the form on page 20 of this booklet to request copies of *Prospectus, September 1972* and *Status and Plans, February 1973*.

2

The Program began early in 1972, after a draft prospectus was circulated that sketched both substantive questions and a plan for creating a nucleus around which diverse participants might organize common activities.

A number of persons throughout Harvard University and outside responded. Most were willing to contribute time for planning and advisory work and to lend their names to the enterprise. More substantial commitments were to be phased in as other prior commitments were met.

Negotiations for a planning grant began over the summer of 1972. A planning committee, chaired by Konrad Kalba, Instructor in City Planning, and including Chris Argyris, Professor of Educational and Organizational Behavior; Thomas Cheatham, Gordon McKay Professor of Computer Science; James McKenney, Professor of Business Administration; Arthur Miller, Professor of Law; and Nikki Zapol developed ideas for Program content and procedures. Steps were taken to start an informal Faculty Seminar involving interested faculty, some students and a few outsiders to the University.

Under the auspices of the Harvard Summer School, a week-long Institute on Telecommunications and Public Policy took place on July 13-18, 1972. As stated in the Institute flyer (Appendix A):

The complex and irreducible interactions among varied social aims and alternative technologies present policy options differing significantly from those in the more familiar consumer, defense or aerospace markets.

Speakers and panelists will explore these interactions through concrete case studies presented in depth, with CATV and education (learning) as primary examples; they will stress critical interdependencies among CATV, education, and other ways and goals of creating, storing, distributing and accessing information.

The Harvard Summer School Institute will give participants from industry, education and government an opportunity to forge -- through lectures, readings and informal discussions -- broader understanding of forces from outside their own spheres which bear on practical goals.

About 125 persons participated in the Institute which was self-supporting through a fee of $380. The proceedings were videotaped and the tapes subsequently requested by the New York State Council of the Arts, Massachusetts Institute of Technology, and by members of Harvard's Faculty of Arts and Sciences and Graduate School of Design.

In November 1972, The John and Mary R. Markle Foundation announced support of the Program with a planning grant for the period February 1, 1973 through January 31, 1974. This grant enabled the Program to build a small staff and otherwise to support the activities described in the remainder of this booklet.

3

The Research Program

Research activities included generating and developing proposals for externally funded research projects and undertaking several small exploratory projects within the scope of the Markle Foundation grant.

Proposal Development Practices

Participants in the Faculty Seminar, other Program participants, including affiliates from outside the University, and Program administration suggested ideas for research, developed proposals for funding or undertook exploratory work.

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

Each project is submitted, in the first instance, to the test of consonance with the aims of the Program. Proposals were prepared at the initiative of Program participants rather than in response to government requests. This practice is 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.

The scope of the Program encompasses a wide range of possible research. Priorities are set in part by coincidence of the interests of Program participants and of prospective audiences. One important focus of interest has been the telecommunications industries heading Figure 1. These industries are in a state of ferment. Many vital policy issues seem likely to be coming up for settlement soon and the need for research is urgent and evident. On the other hand, the breadth of the Program's interests means

that there are also many attractive prospects for exploratory research reflecting individual priorities. The danger of hopeless diffusion is lessened by the regular interaction of Program participants in the Faculty Seminars, reviewing work, and other collaborative efforts, and also by the watchfulness of the Program's staff.

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 clear-cut 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 reviewing process has been one of the most significant successes of the Program to date.

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 opin-

ions 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 in Appendix B.

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 D).

Once funded, each project will have a Project Review Group (Appendix D) similar in composition to the original group of reviewers, but formally charged

with watching over the project.

Proposals Out to Funding Sources

Two project proposals were prepared and shown to funding sources:

- *Structure Determinants of Communications Markets: The Interplay of Public Policy with other Factors.* This is projected as a two year, two-stage study to be directed by Dr. Peter Shapiro, Research Fellow in Information Technologies and Public Policy.
- *City Meets the Cable: Planning Responses to Urban Communications Technology.* This is projected as an eighteen month study to be directed by Mr. Konrad Kalba, Instructor in City Planning, Graduate School of Design.

Both proposals were circulated in preliminary form to about twenty funding sources each. Formal submissions are in progress.

Abstracts of both proposals are given in Appendix C. The form on page 20 may be used to request full copies.

Proposals in Preparation

Two additional proposals are in preparation. One is under the direction of Professor James McKenney of the Business School. It concerns several issues connected with the vertical integration of Western Electric and the Bell System. Professor McKenney wishes to explore the voluntary abstention of Western Electric from the foreign electronics equipment market and the effects that these policies may be having on the quality of domestic telephone service and on national and international competition in information technologies and systems.

The other, being prepared by Nikki Zapol, a member of the Program staff, builds on ideas presented by Professor Laurence Tribe (Law School) at a Faculty Seminar. The working title is "Information Technologies, Information Institutions and the First Amendment: A Legal Case Study of the Balance of Individual Rights and Obligations in Shifting Learning Situations".

Exploratory Work in Progress — Incipient Funded Research

Several small exploratory projects are in progress. Each is expected to produce a working paper for consideration by senior Program participants, ordinarily at the Faculty Seminar. If expansion into a major project seems appropriate, the proposal development procedure outlined earlier will be followed.

Warren Lavey, an undergraduate majoring in applied mathematics, has prepared a paper entitled *Statistical Overview of the Information/Communication Industries* (Working Paper 73-1; a copy may be requested on the form on page 20). This paper begins to assemble major statistical self-descriptions of the broadcast TV, radio, telephone, telegraph, postal and newspaper services. The paper is a first step in describing concretely the economic and social dimensions of the Program's scope.

Paul Berman, a second year student at the Law School who majored in Computer Science at Harvard, is preparing a paper on the disputed border between computers and communications. This paper analyzes certain regulatory and jurisdictional problems posed at that boundary. The working title is "Who Does What at the Computer/Communications Border: Allocation of Functions and the Role of the F.C.C."

Richard Berner, an undergraduate majoring in sociology who took a leave of absence from Harvard in the office of FCC Commissioner Nicholas Johnson, is preparing a paper on

FCC regulation of cable television. The working title of his paper is "Intra-Agency Pressures and the Operation of the Federal Communication Commission's Cable Rules."

Carol Weinhaus, a member of the Program staff, is assembling a bibliography and a small library of materials relevant to the Program. The bibliography will direct researchers to publications of special significance for the Program and to their location in the Harvard Library system. Specialized reports not published as conventional books, government documents and other relevant materials not readily available in the University library system will be accumulated in the Program library.

Finally, several Program participants are collaborating on a paper with the working title, "An Evolving Framework for the Program on Information Technologies and Public Policy." This paper makes a first pass at describing the intellectual dimensions of the Program's concerns in a coherent framework. It also outlines the practical importance of information policies for every citizen. The primary purpose of the paper is to provide a touchstone for the Program's researchers to help them avoid disparate and isolated efforts and to develop individual and common priorities for Program participants. The paper will also be useful for describing the Program to potential researchers, Program advisors, and funding sources.

Research Projects Examined
Several additional research projects started through the review process but failed to mature into proposals for outside funding. Some are still under the Program's eye but not under its aegis. Others were redirected or terminated.

Among the reasons for redirection or termination are:
● Irrelevance to the Program

● Loss of interest
● Evanescence or intractability of subject matter
● Dissatisfaction with quality
● More appropriate home for project found elsewhere
● Pressure of prior commitments on senior participants
● Risks incurred by junior participants engaging in interdisciplinary, policy-oriented work.

In general, these troubles are common to most enterprises. The last two, however, have special significance for a university program. They are discussed in more detail in section 5, "Problem Areas and Emerging Strengths."

No project was abandoned for lack of funding interest. Given the Program's commitment to independent initiative and the basic support for planning by the Markle Foundation, the fundability of projects was considered only after they were accepted as germane to the Program and showed promise of surviving the review process.

Seeking Coherence
When presented to Faculty Seminars, the work contemplated by several Program participants revealed a common thread and drew agreement on high priority. Program administration reinforced this thread by treating these incipient projects as a cluster. Each element was a separate entity, but stood to gain through close collaboration with the others.

All of these projects were concerned with broadband communications, an area overseen by the FCC. Further, all of these projects aimed at identifying the players and the games involved in the structure of industries supplying broadband services and in the patterns of public intervention into them. The projects within this cluster were distinguished according to the player

whose standpoint was to be the primary focus of the analysis. The paper, "Structure Determinants of Communications Markets," uses the standpoint of the firm. In "City Meets the Cable" these affairs are seen from the perspective of the urban administrator. Other studies in which the players were to be the Congress, the financial community, and the FCC, did not survive the development and review process. While the cluster has shrunk, the concept still provides illumination.

The collaborative effort, "An Evolving Framework for the Program," also aims at lending stability and coherence to Program efforts. All present and prospective Program participants may contribute to this work and all are expected to draw on it in framing their own research.

The Communication Program
As indicated in the Introduction, 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 discourse distinct from your own existed, with people in them, discoursing."[2]

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

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

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

Figure 3. The Faculty Seminars — 1972/73

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.

The Faculty Seminar

The Faculty Seminar began in September 1972 and met through the academic year 1972-73. Discussion leaders came from Harvard and outside Harvard. The participants, although principally Harvard faculty, also included selected undergraduate and graduate students and some outsiders. Topics included not only reports of work done, but also plans for work to be undertaken.

Discussions were informal and lively. Ample time was allowed for questions. Frank admissions of incomprehension and fitting translations of terms and other explanations were encouraged and forthcoming.

Both informal notes and complete tape recordings were made of each presentation. Both the notes and the tapes have been used on several occasions by people inside and outside the University wishing to refresh themselves on points brought out during the meetings or to communicate them to associates.

The seminar continues in the academic year 1973-74.

Program Affiliates

The Program has created, and is in the process of expanding, a network of interested people outside the University. These include specialists and generalists from government, the information industries, the legal profession, other academic institutions, etc.

Interested outsiders 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 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*[3]; John Griffith of the IBM Thomas J. Watson Research Laboratories, Yorktown Heights, N.Y.; and Erwin G. Krasnow of the law firm of Kirkland, Ellis and Rowe, Washington, D.C. and author of *The Politics of Broadcast Regulation*[4].

Several overseas correspondents have shown interest in the Program. One, Professor Harry Bloom, Senior Lecturer in Law from the University of Canterbury, is expecting to visit the Program during the winter of 1973-74.

Research Proposal Review

The proposal review procedure described earlier 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

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

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

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 and Program administration. The test of the marketplace still lies ahead.

Research Review Conference
Both proposals prepared to date include a budget item for a "review conference" to convene once a draft project report is available. The conference will include project members, members of the Project Review Committee (Appendix D), 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.

Relations with Government Organizations
Initial 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 for 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; and the White House Office of Telecommunications Policy.

The Teaching Program
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 have sought guidance on particular projects, others are interested in including information technology and public policy into their study plans.

William H. Bossert, Professor of Applied Mathematics, and Anthony G. Oettinger, Professor of Linguistics and of Applied Mathematics offer a course on "Communication in Societies" to undergraduates under Harvard's General Education Program. The course (Natural Sciences 130) explores the science and technology of communication among men, animals and machines, and the effects of communication 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. Contemporary issues attendant to the rapid spread of telecommunications and of computers are presented and discussed.

A graduate seminar in Information Technologies and Public Policy will be offered in cooperation with the Division of Engineering and Applied Physics and the John F. Kennedy School

of Government.

In the spring of 1974, the seminar (Public Policy 283b) will be given by William M. Capron, Associate Dean of the Kennedy School and Lecturer on Political Economy; John R. Meyer, 1907 Professor in Transportation, Logistics and Distribution; Arthur R. Miller, Professor of Law; and Anthony G. Oettinger, Professor of Linguistics and of Applied Mathematics, all participants in the Program.

The seminar will consider public information policy issues at all levels of government and industry. Emphasis will be on the allocation of national information functions among available technologies and associated institutions (book libraries, schools, broadcast or cable TV, telephone, etc.). The course will also treat impact on individuals, organizations and public policy-making; and the allocative roles of public and private interests.

Another course, on the structure of the computer industry, is being planned in cooperation with Harvard's Center for Research in Computing Technology and the Division of Engineering and Applied Physics.

Program Administration
The small Program staff listed on p. 1 is capable of handling the present level of Program activity; no additions are planned. However, the short-term nature of Program funding gives some cause for concern over the stability of staffing.

Program Committees
A Policy Committee and an Executive Committee (membership listed on page 1) are the only operational committees to date. Their function and that of other planned Program committees are outlined in Appendix D.

Until Program growth warrants creating the other planned committees, their functions are handled by the Executive Committee. Some prospective mem-

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 DECICISION: 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

Figure 3. The Faculty Seminars -- 1972/73

bers of an Advisory Committee made up of persons from outside the University have been identified and are serving informally. On their advice formalizing that committee also awaits further growth of the Program.

Several ad hoc Project Review and Project Advisory Committees have served during the year in connection with the project planning activities described on page 6.

Program Budget

The activities described in this booklet have been carried out in part under a planning grant from the John and Mary R. Markle Foundation. Actual spending from this grant has been close to budget. Budgeted and actual expenditures are shown in Appendix E. Except for some salary in the summer of 1973, the time of the Director and of other principal faculty participants has been contributed by Harvard University.

Financial Plans

The backbone of the Program, as suggested in the Introduction, is to be a set of research projects. The Program will not become a funding agency for these projects; instead, each will be submitted for outside funding on its own merits.

Certain *core* Program activities, however, must be supported through general funding from within the University or outside.

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

Planning, direction, and administration covers the obvious activities 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
- Institutes and conferences
- 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. As noted in section 2, 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 needed primarily for research planning and for much of the Communication program, key elements in lending the Program breadth and coherence, independence and responsiveness.

Additional details of financial planning are given in the *Discussion Paper on Program Funding* listed on the order form on page 20.

4

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. By bringing these people together we hope to develop a common language for discussion of information problems. A common language, it is hoped, will overcome further fragmentation of knowledge and foster a reasoned interplay among these interested parties.

A specific adminsitrative 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 responsibility, 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.

Other processes described in this booklet also encourage coherence. These include the project review process, the cluster concept, the development of "An Evolving Framework for the Program on Information Technologies and Public Policy," in the Research program; the Faculty Seminar, the project review conferences, etc. in the Communication program; and participation of faculty from four distinct schools of the University in the seminar to be offered under the Teaching program.

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 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.

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.

5

PROBLEM AREAS AND EMERGING STRENGTHS

Problem Areas
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.

Some specific examples make this basic internal problem clearer.

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

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

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.

Emerging Strengths

The greatest visible accomplishment of the Program, and also its greatest current strength, is the success of its critical review procedures. Senior faculty, however reluctant or unable to commit personal research time, have contributed generously not only to the formal reviewing process but, more important perhaps in the long run, to the Teaching program and to the guidance and supervision of the junior people.

Outstanding young people —undergraduates, graduate students and junior faculty—have associated themselves with the Program. At the very least, this promises significant Program contributions to industry, government and other universities in later years. In the meantime, students and junior faculty are proving to be significant contributors to Program research.

Interest in the Program has run high. As is apparent from this report, it has not been necessary to stimulate interest. Instead, energy could be concentrated on developing strong latent interest into a workable and productive Program.

With several research efforts under development and two proposals completed, it is now apparent that the Program is off to a sound start and has succeeded in at least one important respect: There has been genuine interdisciplinary work and a genuine meeting of minds on some important but hitherto neglected issues.

The combination of the strengths of the Program is a powerful one, and has led participants to conclude that the effort should be continued. The problems noted may, in the end, overwhelm the emerging strengths. The current balance, however, favors the continual growth of the Program.

6

APPENDIX A

Harvard Summer School, Institute on Telecommunications and Public Policy,
July 13-18, 1972
The Harvard Summer School, in cooperation with the *Harvard Center for Research in Computing Technology*, announces the Institute of Telecommunications and Public Policy: Understanding Complex Forces of Change. Telecommunications and

related technologies offer many competing ways of serving citizens who, in varied endeavors, are seeking the knowledge they need to participate fully in our society. The complex and irreducible interactions among varied social aims and alternative technologies present policy options differing significantly from those in the more familiar consumer, defense or aerospace markets.

Speakers and panelists will explore these interactions through concrete case studies presented in depth, with CATV and education (learning) as primary examples; they will stress critical interdependencies among CATV, education and other ways and goals of creating, storing, distributing and accessing information.

The Harvard Summer School Institute will give participants from industry, education and government an opportunity to forge—through lectures, readings and informal discussions—a broader understanding of forces from outside their own spheres which bear on practical goals.

Director: Anthony G. Oettinger
Associate Director: Nikki Zapol

Speakers:
Technology and System Configurations of Cable Transmission: Options and Costs. Lewis S. Billig: Technical Director for Communications, the MITRE Corporation, in charge of military and civilian communications programs ranging from advanced satellite communications systems to large-scale telephone networks. He recently chaired the National Academy of Sciences/FCC Study of common carrier/user interconnections, and is currently undertaking several two-way CATV studies and experiments.

Market Economy and Public Policy in Television. Les Brown: television and radio editor of *Variety*, draws from twenty years of experience as a journalist, entrepreneur and teacher in the en-

tertainment field. A former song writer, television script writer and producer, he attracted Joan Baez, Bill Cosby, Bob Dylan and others to perform early in their careers at his avant garde Chicago cabaret, The Gate of Horn. His book, *Television: The Business Behind the Box*, was published by Harcourt Brace Jovanovich in the fall of 1971.

TV and Other Media in the British Open University: What Happens in Practice. Richard Hooper: an Oxford graduate who has worked on both the radio and TV sides of BBC, is Senior BBC TV Producer in the Open University's Faculty of Educational Studies. As a Harkness Fellow in 1967-68, he traveled extensively in the United States surveying developments in educational technology. He served as Special Staff Consultant to the U.S. Commission on Instructional Technology, has published articles on education and educational technology on both sides of the Atlantic, and just edited a book on curriculum development.

The New Rural Society. Peter Goldmark: President and Director of Research, Goldmark Communications Corporation. He retired last year as President and Director of Research of CBS Laboratories, having joined CBS in 1936 as Chief Television Engineer. The LP 33-1/3 rpm record and Electronic Video Recording are among his best known inventions. As chairman of a National Academy of Engineering, Connecticut Research Commission joint committee on urban problems, he has sparked the concept of using telecommunications to link newly-created "satellite cities" with metropolitan urban centers.

Designing a Communications Utility: Cable Television and Urban Needs. Konrad A. Kalba:- Instructor in City Planning, Graduate School of Design, Harvard University, was a staff member of the Sloan

Commission on Cable Communications. Drawing on his background in both urban planning and communications, he has written several studies and articles on the application of cable television to urban problems and is editing an upcoming issue on cable television of the *Yale Review of Law and Social Action*.

Information Technologies and Public Policy: An Overview. Anthony G. Oettinger: Professor of Linguistics and of Applied Mathematics at Harvard University where he is also Research Associate to the Program on Technology and Society. He is Chairman of the Computer Science and Engineering Board of the National Academy of Sciences, and a past president of the Association for Computing Machinery. The author of *Run, Computer, Run: The Mythology of Educational Innovation*, he has recently contributed "Will Information Technologies Help Learning?" to a forthcoming volume in the Carnegie Commission on Higher Education Series. Nikki Zapol: consultant to the Academy for Educational Development, served on the staff of the Commission on Instructional Technology and helped in the production of the AID film "Classroom TV: Instrument for Educational Change", and accompanying handbook, designed for use in developing countries. She collaborated on "Will Information Technologies Help Learning?" with Anthony Oettinger.

The Effectiveness of Telecommunications and Alternative Technologies. Alex Reid: Director of the Communications Studies Group at the Joint Unit for Planning Research, University College, London. This interdisciplinary group, sponsored jointly by the British Post Office and the British Government, undertakes laboratory, field and survey studies to determine the effectiveness and impact of new developments in person-to-person

telecommunications. With a background in architecture and urban planning, he is particularly interested in long-term effects of telecommunications on housing and travel patterns.

CATV: A Historical Review of the Problems and Issues. Ralph Lee Smith: staff member of the Systems Development Division of The MITRE Corporation, is an authority on telecommunications, notably cable television and urban problems. An expanded version of "The Wired Nation", his multiple award-winning article in *The Nation*, is being published this year by Harper and Row.

Information Technologies and the Library System: Example, Adjunct or Competitor. Ronald L. Wigington: Director of Research and Development at Chemical Abstracts Service where he is currently developing a major computer-based information system. The report, *Libraries and Information Technology: A National System Challenge*, recently published by the National Academy of Sciences, was written under his chairmanship. He is on the faculty of the Department of Computer and Information Science, Ohio State University, and is active in international scientific information exchange affairs.

Panelists

Stephen K. Bailey, Chairman of Policy Institute, Syracuse University Research Corporation; Richard Burgheim, Director, CATV Program Projects, Time-Life Broadcast; Timothy W. Costello, Deputy Mayor, City Administration, New York; Nathaniel Feldman, Senior Engineer in Communications Policy Program, Rand Corporation; Roger D. Fisher, Professor of Law, Harvard University; Jeremiah Kaplan, President, Macmillan Company; Paul Klein, President, Computer Television, Incorporated; Theodore S.

Ledbetter, Jr., President, Urban Communications Group; Richard Marsten, Director of Communications Program, NASA Headquarters; Harvey J. McMains, Director, Management Sciences Division, American Telephone and Telegraph; Andrew Rouse, Vice President, Corporate Development, INA Corporation; Paul Saettler, Professor of Education, Sacramento State College; Sol Schildhause, Chief of Cable Television Bureau, Federal Communications Commission; Harry Silberman, Director, Planning Unit, National Institute of Education; James Q. Wilson, Chairman, Department of Government, Harvard University.

APPENDIX B

Guidelines for the Review of Program Proposals and Reports

The review group combines educated and well-informed laymen and experts. The purpose of review is to help authors make their proposals or reports as convincing as possible to their intended audiences and to provide greater assurance that the authors and the Program on Information Technologies and Public Policy are creditably represented by proposals and reports issued under the Program.

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 be-

fore 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?

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?

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 addi-

tional figures or tables needed? Are the style and organization adequate? Are there statements that are ambiguous or may be misunderstood?

Is the report convincing?

Are the arguments likely to be convincing to the non-specialist? If there are 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?

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 possibil-

ity 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 conclusions.

APPENDIX C

Abstracts of Proposals
"Structure-Determinants of Communications Markets: The Interplay of Public Policy with Other Factors"
Peter Shapiro

Public policy can influence the adequacy of information/communications services through impact on the structure[5] of markets. But public policy is not the only factor that allocates functions performed by particular firms. Rather, policy interacts with other function-allocating factors in what is called a "structuring process."

The factors that interact with policy to determine structural outcomes include: strategies of the firms, financing, market demand, and attributes of the technologies employed. Research is proposed to analyse and explain the *interaction among* and the *relative significance of* these factors. Central research questions will be: What is the structuring role of policy in the context of the other factors? How do the other factors affect the structural impact of policy? What is the relative significance of policy in determining structural outcomes? How might other factors be useful as policy instruments?

The nature of the interplay of policy with these other factors, although critical, has not been sufficiently analysed or explained. Yet if information on the structuring process were available, policy makers could better assess the likely consequences of function-allocating decisions. Information on the structure-determining role of policy in the context of the other factors, and on the ways that other factors respond to policy actions, is needed to assess and develop the policy instruments that affect market structure.

Analysis will be in two stages, each stage culminating in a conference on the findings and a report. So that the task will be both feasible and addressed to the central questions, the proposed research will focus on selected information/communications sectors where there is structural turbulence and high economic and social stakes -- i.e., the private-line and switched-data-transmission markets.

The first-stage report will analyze the history of function-allocating events in the private-line and switched-data-transmission markets and will advance preliminary propositions concerning the structuring process. Based primarily on public records, this report will establish guidelines for more focussed analysis in the second stage.

The second-stage report will further test and develop the propositions through intensive exploration of the process as illuminated by the actions, perceptions and experiences of a highly involved firm. Data sources for the second stage will include interviews with personnel of the selected focal enterprise, of competing firms and of governmental, financial and marketplace institutions that are involved. The decision to proceed with the second stage will be affected by the extent of cooperation that is committed by the focal enterprise.

"City Meets the Cable: Planning Approaches to Urban Com-

[5] market structure: attributes of a market including the nature of the functions being performed, the distribution of market shares to firms supplying the market, the barriers to entry of new companies.

munications Technology"
Konrad Kalba

Cable television is a promising urban technology that municipal governments are only beginning to understand. Yet local jurisdictions have considerable planning and regulatory prerogatives with respect to the development of cable television systems. While most cities do not as yet have franchised cable TV systems, many others have already been heavily involved.

The purpose of the proposed study is to analyze how cities have actually approached cable TV decision-making to date date as a basis for improving local local cable planning and regulation in the future. The lack of empirical data on local cable TV decision-making and the assumed partial transferability of experience from one city to another are basic justifications for pursuing the research. In addition, it is expected that the study will contribute to a better comprehension of cable TV policy issues at other levels of government (i.e., federal and state) as well as within the cable TV industry.

Specifically, the proposal calls for case studies of three cities where cable-TV has been an issue. These studies will focus on local decision contexts (social, political, economic), the decision-making groups and processes, and on ultimate outcomes. Relations among these facets will be analysed and policy options will be assessed.

APPENDIX D

Administrative Plan

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, com-

merce, 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.
Program Director. The Program Director shall:
    a. convene and chair the Faculty Seminar.
    b. present all Program budgets and proposals to the Policy Committee.
    c. conduct the affairs and direct the Program staff in accordance with the policy set by the Policy Committee.
    d. recommend appointments of Senior Staff members with the advice of the

Policy Committee.
Staff. Senior staff of the Program shall include the Associate Director, Research Associates and others eligible for Corporation appointments, including Visiting Fellows, as may be determined by the Policy Committee.

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 along the lines suggested, perhaps in the first instance as *ad hoc* subcommittees of the Policy Committee. Of the committees suggested below, 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 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.
Finance Committee
This committee is responsible for establishing the budget of the Program and for identifying and contacting funding sources. Although not responsible for negotiating grants or contracts for specific substantive project activities of the Program, its participants or its staff, the Finance Committee shall be generally cognizant of the financial aspects of all Program activities.

The Finance Committee shall keep the Executive Commit-

tee and the Policy Committe informed of the Program's financial state and consult with these committees on financial affairs of the Program. This committee will be supported by the Program staff through the preparation of draft budgets, such financial reports as the committee shall require and follow-up on fund solicitations initiated by the committee members.

Human Resources Committee

This committee is responsible for searching out and recommending Program participants from inside and outside the University, staff members, committee appointments, etc. This committee will determine, through the knowledge of its members and such contacts and information sources as they may have, the background and qualifications of people it recommends. The committee will work with the Program Director and the Policy Committee in maintaining appropriate liaison with the home institutions of the Program participants, in linking students with appropriate faculty or outside advisors, etc.

Plans Committee

This committee shall oversee the ongoing activities of the Program and its staff to assure that the plans and projects established are being carried out expeditiously as directed by the Executive Committee or specified in project proposals. This committee works extensively with the Associate Director in relieving the Program Director of the load of routine continuity for the work of the Program and its staff and in assuring that the resources of the University are used to best advantage in that work.

Communication and Liaison Committee

This committee will maintain contact with appropriate individuals and organizations inside and outside the University for the dual purpose of communicating the general activities and results of the work of the Program and for learning about problems, interests and issues within the Program's sphere. The committee also shall work closely with the Program's Information Analyst in making relevant and useful information readily available to Program participants and staff; it shall be responsible for the preparation of the annual report of the Program and such other summary reports on the Program as may be required from time to time.

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 E

Status of the Markle Grant—September 1, 1973

Category	Encumbered or Paid	Budgeted	Unencumbered
A. Salaries & Wages	$34,005	$36,750	$2,745
B. Benefits	5,000	4,505	(495)
C. Expendable equipment & supplies	400	750	350
D. Travel, domestic	1,500	1,500	0
E. Travel, foreign	0	1,000	1,000
F. Publication costs	0	500	500
G. Communications, etc.	2,000	1,500	(500)
Total Direct Costs	42,905	46,505	3,600
Indirect Costs	13,715	13,715	0
Total Costs	$56,620	$60,220	$3,600

Papers Available from the Program on Information Technologies and Public Policy as of September 1973

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

Title	Quantity	Cost
Prospectus An initial description of the Program's perceptions, goals and plans. (Sept. 1972. $2.75)	_____	_____
Status and Plans An updated description of the Program's goals, history, status and plans. (Feb. 1973. $1.00)	_____	_____
City Meets the Cable: Planning Approaches to Urban Communications Technology A proposal to study the cable decision process in three case cities and to draw generalizations. (June 1973, $1.50)	_____	_____
Discussion Paper on Program Funding A paper discussing funding strategies and their relation to the Program's goals and structure. (Aug. 1973, $ .75)	_____	_____
Statistical Overview of the Information/Communication Industries A rough census of the information industries. Preliminary attempts at comparison are made. (Aug. 1973, $3.00)	_____	_____
Structure-Determinants of Communications Markets: The Interplay of Public Policy with Other Factors 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. (Aug. 1973 $1.50)	_____	_____

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 page 8 or in Appendix A seem to be of special interest, we will deliver available notes or tapes for the cost of reproduction.