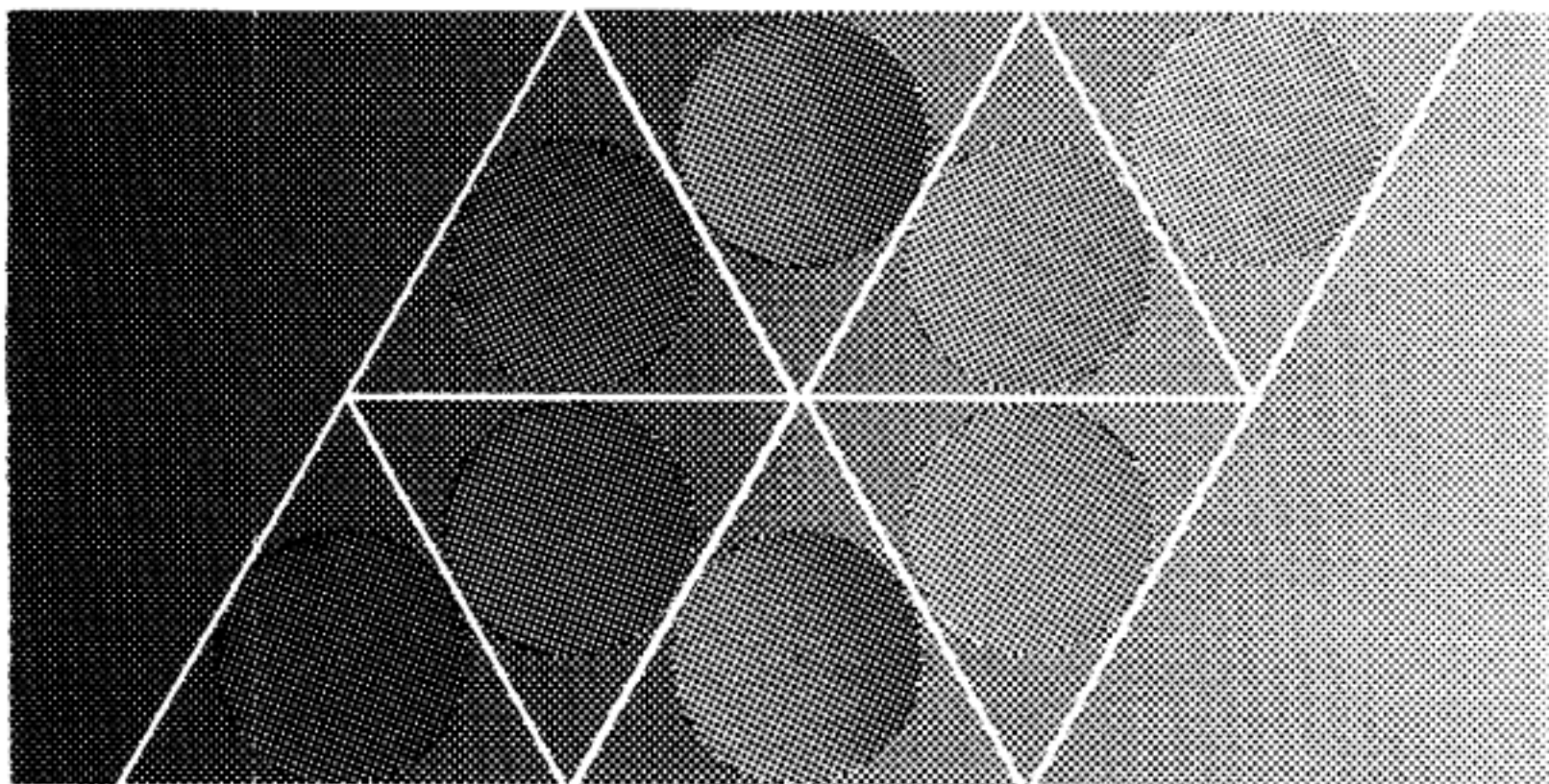

Information Resources: *Performance, Profits & Policy*



 ***Program on
Information Resources Policy***

Harvard University



Information Resources: *Performance, Profits & Policy*

*The Harvard Program's
Working Partners as of
November, 1978*

Abt Associates Inc.
Action for Children's Television
American Can Company
American District Telegraph Company
American Newspaper Publishers
Association
American Telephone and Telegraph
Arthur D. Little Foundation
Auerbach Publishers Inc.
Bell Canada
Beneficial Management Corporation
Boston Broadcasters Inc.
The Boston Globe
Burroughs Corporation
Canada Post
Central Telephone & Utilities Corporation
Codex Corporation
Common Cause
Communications Workers of America
Computer & Communications Industry
Association
Consolidated Edison Company of New
York, Inc.
Des Moines Register and Tribune
Company
Donaldson, Lufkin & Jenrette
Doubleday and Company, Inc.
Economics and Technology, Inc.
Encyclopaedia Britannica
L. M. Ericsson
Federal Communications Commission
Federal Reserve Bank of Boston
Field Enterprises, Inc.
First National Bank of Boston
First National Bank of Chicago
General Telephone & Electronics
Corporation
Hallmark Cards Inc.
Harte-Hanks Communications, Inc.
Honeywell, Inc.
Household Finance Corporation
IBM Corporation
Information Gatekeepers, Inc.
International Data Corporation
International Paper Company
International Resource Development Inc.
International Telephone and Telegraph
Corporation
Iran Communications & Development
Institute
Lee Enterprises, Inc.
Lockheed Missiles & Space Company, Inc.
John and Mary R. Markle Foundation
Marsteller, Inc.
McGraw-Hill, Inc.
Mead Corporation
Meredith Corporation
Minneapolis Star and Tribune Company
National Aeronautics and Space Adminis-
tration
National Association of Letter Carriers
National Telephone Cooperative
Association
The New York Times Company
Nippon Electric Company
Norfolk and Western Railway Company
Oppenheimer & Company, Inc.
Payment Systems, Inc.
J. C. Penney Company, Inc.
Pergamon Press Ltd.
Pitney Bowes
The Public Agenda Foundation
Reader's Digest Association, Inc.
Reuters, Ltd.
Salomon Brothers
Seiden & de Cuevas Inc.
Siemens AG
Southern Pacific Communications Company
Stromberg-Carlson Corporation
Systems Applications, Inc.
Time Inc.
Times Mirror
Transamerica Corporation
U.S. Department of Commerce:
National Technical Information Service
National Telecommunications and Infor-
mation Administration
United States Postal Service
United Telecommunications, Inc.
The Washington Post Company
Western Union International, Inc.
Xerox Corporation

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

**Program on
Information Resources Policy**

Anthony G. Oettinger
Chairman

John C. LeGates
Director

John F. McLaughlin
Executive Director/Postal and Allied Arenas

Available on request are the following publications:

Information Resources: Performance, Profits and Policy

The Program: Who We Are and What We Do

The Program in Brief

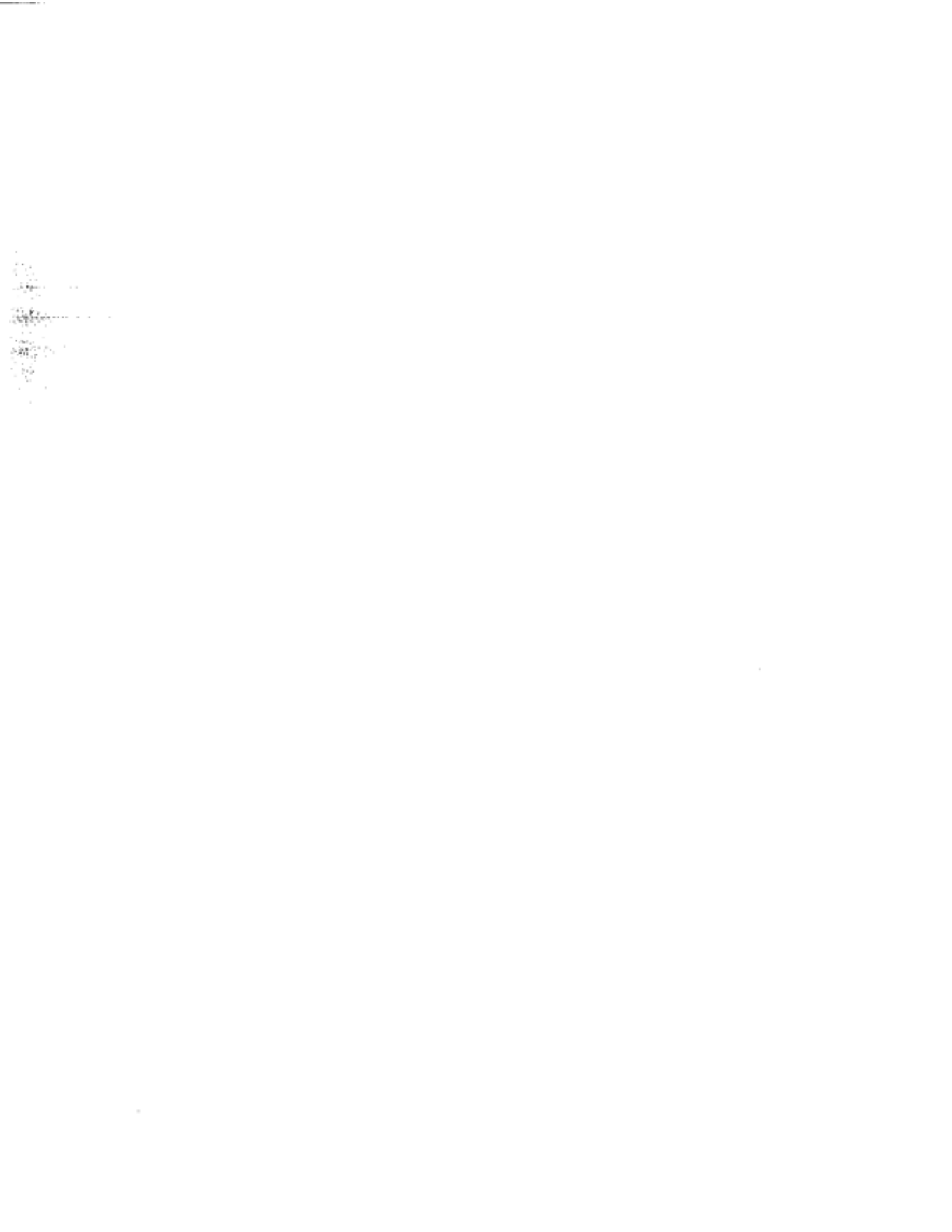
Available Publications

List of Affiliates

200 Aiken
Harvard University
Cambridge, Massachusetts 02138
617 495-3986

Contents

Section 1	page 5	Information Resources: A Critical Concept for Decision-Makers
	5	Information Resources are critical for managing our other basic resources.
	7	Information Resources are valuable commodities in themselves.
	8	Information Resources are costly. They also are essential for planning, directing and monitoring.
	9	Today, technology and politics are changing the cost of information resources and control over them.
	10	Already your performance and profits may depend on tracking policy changes . . . on deciding how to respond to them . . . or even on becoming involved in altering their direction.
<hr/>		
2	11	The Harvard Program
	11	Harvard University's Program on information resources policy has working partnerships with over 70 organizations—corporations, labor and government—for the purpose of exploring the implications of change and developing policy options.
<hr/>		
3	14	Changing Costs
<hr/>		
4	23	Changing Control
<hr/>		
5	31	Appendix
	31	Information costs per dollar of revenues
	34	Notes



1

Information Resources: A Critical Concept for Decision-makers

**Information resources are
critical for managing our other
basic resources**

Information resources: The concept

"Information Resources" is a concept like energy resources. Both of these resources are fundamental to the well-being of individuals and organizations in today's world.

As with energy, politics and technology are changing the ways in which information is produced, stored, communicated, processed, and used. No crisis like the Arab oil embargo has dramatized the implications of these changes. Yet, they are real and at hand.

Impacts already are fully felt on information *conduits* like postal, telephone and computing facilities. And *contents* too—advertising, business data, government records and so on—are affected by rising forces of change.

Thus the implications of changing conditions with respect to "information resources" yield opportunities as well as threats. At first these are mainly perceived by those industries which create and handle information as their principal lines of business. But there are implications too for every organization that relies on information for efficient management and for thoughtful decision-making.

Indeed most organizations are sensitive, even vulnerable to change, for they—in some cases without as yet realizing it—are spending a substantial portion of their operating budgets on "information resources" to effectively and efficiently conduct their operations.

An historical perspective

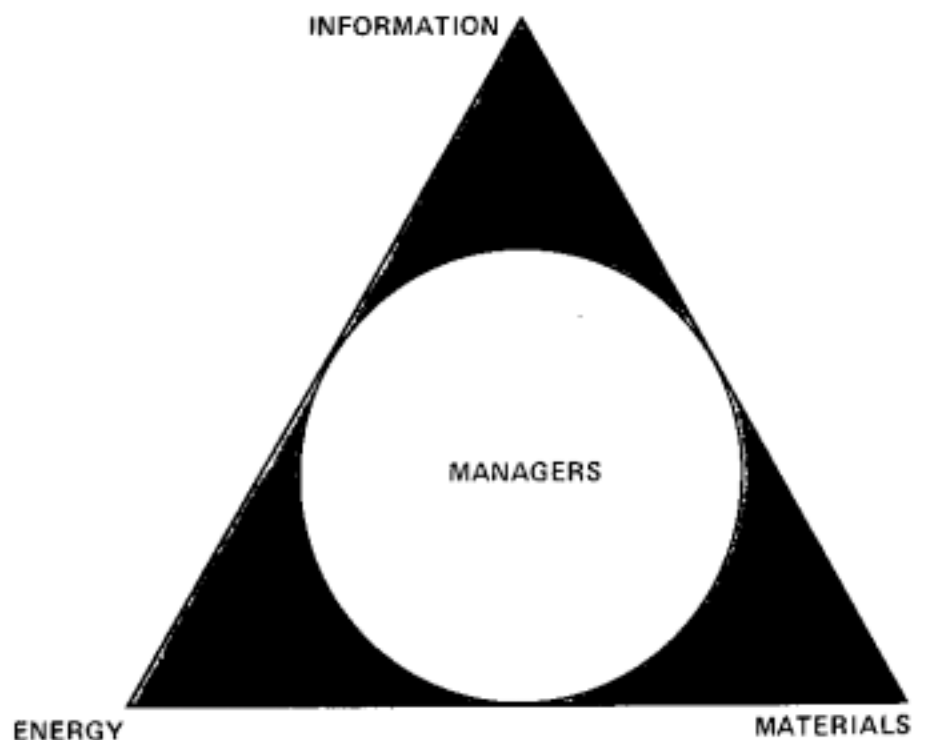
"At the beginning of this century the American economic system still included elements of financial and family capitalism. Managerial capitalism was not yet fully dominant . . . But by 1917 representatives of an entrepreneurial family or a banking house almost never took part in middle management decisions on prices, output, deliveries, wages, and employment required in the coordinating of current flows. Even in top management decisions concerning the allocation of resources, their power remained essentially negative. They could say no, but unless they themselves were trained managers with long experience in the same industry and even the same company, they had neither the information nor the experience to propose positive alternative courses of action."¹

Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business*.

A current perspective

The unifying concept of "information resources" is a modern idea. As one stakeholder has put it: "There is growing agreement that we have entered a new era, a post-industrial stage of development in which the ability to put information to use has become critical, not only to the essential production of goods, but to efforts to provide a better life for the individual, as well."²

"Without materials, there is nothing; without energy, all stands still; without information, all is chaos."



**Information resources
are valuable commodities
in themselves**

The information industries

Major industries produce, distribute, store or process information as their main product. In the list below, gross revenues indicate the size of today's major information industries.

Boundaries among information industries are vanishing. Illustrations are the substitution of electronic messages for mail, the emergence of cable television as a competitor not only of broadcasters, but of newspapers and telephone companies too, and the merging of IBM's and AT&T's formerly distinct markets in computers and communications. For consumers and users of information resources, this offers a wider range of choices.

The choices, however, like those between burning oil or coal, are influenced by government policies affecting the price of information resources and control over them.

Annual gross revenues of major information industries indicate their importance to the economy

INFORMATION INDUSTRIES	Approximate Gross Revenue (in billions of dollars)				
	1970	1974	1975	1976	1977
Telephone	18.2	28.3	31.3	35.6	40.8
Telegraph	0.4	0.5	0.5	0.5	0.6
Specialized common carriers	0.0	0.0	0.0	0.1*	0.2*
Satellite carriers	0.1	0.1	0.1	0.2	0.2
Mobile radio systems	2.0	2.9	3.2	3.5	a
Postal service	6.3	9.0	10.0	11.2	13.0
Private information delivery services	0.7+	1.3+	1.6+	1.7+	2.4+
Pulp, paper & board	13.0+	17.1+	a	a	a
Photographic equipment & supplies	3.9+	6.0+	a	a	a
Radio, TV, & communication equipment	12.8+	16.8+	a	a	a
Electronic components & accessories	12.8+	20.3+	a	a	a
Computer systems manufacturers	b	16.6	18.8	21.1	23.8
Computer software & service suppliers	1.6	3.2	3.8	4.5	5.3
Broadcast television	2.8	3.8	4.1	5.2	5.9
Cable television	0.3	0.6	0.7	1.0	a
Broadcast radio	1.1	1.6	1.7	2.0	a
Motion pictures	3.8	5.5	5.4	a	a
Organized sports, arenas	1.0+*	c	c	c	c
Theaters	1.5	2.5	2.7	a	a
Newspapers & wire services	7.0	9.6	10.5	11.7*	13.4*
Periodicals (including newsletters)	3.2	4.1	4.4	5.0*	5.6*
Business consulting services	0.9	1.7	1.8	a	a
Advertising	7.9	9.7	10.0	a	a
Brokerage industries	40.6	64.0	69.1	a	a
Book publishing & printing	3.4	4.5	4.8	5.2*	5.6*
Libraries	2.1	d	d	d	d
Schooling	70.1	97.7	110.8	121.4	130.6*
Research & development	25.9	32.7	35.1	38.5	42.7*
Federal information institutions					
Census Bureau	0.1	0.1	0.1	0.1	0.1
National intelligence community	4.0+*	7.0*	10.0+*	6.0+*	a
NTIS [†]	0.0	0.0	0.0	0.0	0.0
Social Security Administration	1.0	1.9	2.2	2.6	2.7
County agents, government	0.3	0.4	0.4	0.5	0.5
Banking & credit	61.1	136.2	132.7	a	a
Insurance	92.6	133.1	148.8	a	a
Legal services	8.5	13.7	14.8	a	a

See notes, page 34, for explanation of reference letters.

* estimated

+ additional

**Information resources are costly.
They also are essential for planning,
directing and monitoring.**

What information costs

Information costs are incurred in producing all services and material goods. As illustrated by the following table, these costs vary from industry to industry. In the Appendix at page 32 an industry-by-industry list appears.

The listed figures are derived from a U.S. Department of Commerce report, *The Information Economy*.¹

TYPE OF INDUSTRY	Information cost as % of gross income	Information cost relative to other industries
Wholesale and retail trade	42%	high
Plastics and synthetic materials	18%	medium
Livestock and livestock products	3%	low
Industry average	19%	

Why costs arise

The costs stem from acquiring and using information at all levels of management and production.

strategic plans
market planning
capital budgeting
management policies
management reports
etc.

know-how and trade secrets
production schedules
customer lists
advertising
receivables and payables
payrolls
taxes
regulations
etc.

Where costs arise

Information costs stem from activities that require information resources. The sample below is drawn from the U.S. Department of Commerce report, *The Information Economy*.¹

ACTIVITIES	ASSOCIATED INFORMATION RESOURCES
Accounting and bookkeeping	Accountants, bookkeepers, supporting clerical staff; accounting machinery, telecommunications, EDP facilities.
Advertising	Writers, artists, account managers; photocomposing, art, film and video facilities.
Correspondence; duplicating	Secretaries, duplicating machine operators; typewriters, composers, stationery, paper.
Direct mail; printing	Machine operators, pressmen; addressographs, computer files, stationery, paper, labeling and stamping machines, printing presses; folding, binding, and platemaking equipment.
Electronic data processing (EDP)	Programmers, consultants; computer hardware and software facilities.
Legal	Attorneys, supporting clerical staff; telecommunications, EDP facilities.
Management	Managers, support staff, consulting economists, market analysts, scientists; telecommunications, EDP facilities.
Research and development; libraries	Scientists, technicians, librarians, support staff; laboratory equipment, books, filing cards.



Today, technology and politics are changing the cost of information resources and control over them.

Changing costs

	page
Labor and Capital: New Choices	14
Innovations in Electronics	15
Differences among Technologies	16
The Tangled Web of Government Regulation	17
Communications: Capital Investment Choices	18
Choices among Media: Government Influences	19
Choices among "Postal" Services	20
Choices among Information Industries: Prices and Politics	21
Telecommunications and Economic Clout go up together	22

Changing control

	page
Corporate Management: Flexible Choices	23
Corporate Management: New Opportunities	24
Applied Technology: Eavesdropping	25
International Relations	26
Money Flow	27
The Computer Society	28
Questions are beginning to be asked	29

● *Already your performance and profits may depend on tracking policy changes . . . on deciding how to respond to them . . . or even on becoming involved in altering their direction.*

Performance, profits and policy

"Along with the spectacular improvements in communication came the development of the computer. For the multinational enterprise, the importance of the computer lay in the fact that the routine data needed for the direction and control of global operations could be transmitted in vast quantities and could be retrieved and regrouped with lightning speed."¹

Raymond Vernon, *Storm over the Multinationals: The Real Issues*.

"Sure, we need to know more about postal policy and options. Right now we couldn't survive without the post office."²

Otto Almsy, Vice President, Transamerica Insurance Group.

"In our March 1977 hearings, Dr. Tony Oettinger [of Harvard] was one of our most notable witnesses. He crystallized the concept of convergence of computers and communications, and their infrastructure, with the word 'comunications'. Our concern with information policy is inextricably tied to computers and to the communications network."³

Senator Ernest F. Hollings, Chairman, Subcommittee on Communications, Committee on Commerce, Science and Transportation.

Who's watching?

Who in your organization tracks, responds to and influences changing costs and changing controls of information resources?

BOARD OF DIRECTORS	GENERAL COUNSEL
CHIEF EXECUTIVE OFFICER	Regulation
Chairman	Patents, copyrights
President	Ethics
	Records
EXTERNAL AFFAIRS	ADMINISTRATION
Public Relations	Personnel, labor relations
Government Relations	Facilities
	Purchasing
CORPORATE DEVELOPMENT	General services
Strategic Planning	OPERATIONS
Acquisitions, divestitures	Engineering
INTERNATIONAL	Production
	Distribution
FINANCE	MARKETING
Treasurer	Market research
Management information systems	Sales
	Advertising
	Product development
	Consumer affairs
	RESEARCH AND DEVELOPMENT

Harvard University's Program on Information Resources Policy has working partnerships with over 70 affiliates—corporations, labor and government—for the purpose of exploring the implications of change and developing policy options regarding the production and use of information resources.

The Harvard Program's basic questions

Working with its affiliates, the Program explores what are the goals of policy, what are the means, and who says so.

What the Harvard Program does

Research presently focuses on four principal arenas: Postal Services, Communications (computers-and-communications), Media, and Electronic Funds Transfer. Much of the Program's work addresses interrelationships among these four arenas as well as among other information activities such as management information systems, libraries and schools. We also examine common problems: regulation, privacy, access and so on.

The Program describes arenas of conflict, names significant players, enumerates stakes, identifies "forces in action," marks trends and discusses strategies.

The Program specifies policy options and their likely consequences but does not take sides or prescribe solutions. It conveys its findings to anyone who cares.



Ma Bell fights for her monopoly

The promise of high profits through high technology has set off a spectacular battle among communications giants, in the marketplace and in Congress.

By Milton R. Benjamin and William H. Read

A 12 1/2 M. was a very special day in 1976. The program was steps in the steps from a mere office of the chairman of a major of company. "Frank" was the

John's Magazine representative. "I've just had an interest call from the Federal Communications Commission. They want to know our position on the program, and then we'll be..." "It's the 12th. Frank" the chairman said.

Milton R. Benjamin is an associate editor of *Harvard Business Review*. William H. Read is a fellow of Harvard's Program on Information Resources Policy.

Papers and Articles: *The New York Times Magazine*, November 28, 1976/Section 6.

Impartiality and competence

As we see it, policy-relevant information is useful insofar as it is both competent and impartial. But these are hard to combine. Those who are most competent are in the business and therefore have stakes. They are either partial or presumed to be. Those who are least partial are not in the business and don't have access to key information. This limits their competence. The Program has developed its own solution to this dilemma.

The Program's impartiality is based on seeking funds from affiliates who compete and conflict. No funding source is so large that the Program cannot afford to lose it. For every source we seek a competitor and a user.

All the Program's work is public, and all affiliates know this from the beginning.

The backbone of the Program's work is review of draft agendas and reports by the stakeholders. Each paper is written as well as possible within the University. It then goes to each interested affiliate. We ask three questions: Have we addressed the right issues? Do we have the facts straight? Have we represented your point of view?

We also seek expert review. If a study touches on questions of economics, engineering, and law, we seek review from economists, engineers, and lawyers.

The role of affiliates

The partnership therefore means that the Harvard Program's affiliates provide financial support; reviews of strategy; and information on themselves.

The affiliates in turn gain an understanding of the changing policy and business environments as well as exposition and analysis of their views in a non-adversarial public forum.

PUBLIC DIPLOMACY AND THE FUTURE

MEMORANDUM
FOR THE
MEMBERS OF THE
COMMISSION ON
INTERNATIONAL RELATIONS
HOUSE OF REPRESENTATIVES
OFFICE OF THE DIRECTOR
WASHINGTON, D. C.
1977

Congressional Testimony:
John C. LeGates, Director of the Program
on Information Resources Policy, June
24, 1977.¹

The Harvard Program's products

The Harvard Program is organized to offer original research and roundups of other work; regular seminars for researchers and players; Congressional testimony; visits and presentations, both on and off campus; workshops and conferences; study programs for visitors from industry and government; and undergraduate and graduate teaching.



Workshops, Conferences and Study Programs: former Labor Secretary John Dunlop (top), professor at the Harvard Business School, and Representative Tim Wirth (bottom), of the House Committee on Commerce, Science and Transportation, Subcommittee on Communication, were among the discussion leaders at an executive forum held in March 1977 by the Program on Information Resources Policy and the Nieman Foundation for Journalism.



Rick Stafford

3

Changing Costs

Labor and capital: New choices

Industrial and agricultural occupations have declined while service occupations have increased. Among the service occupations, the information sector has grown most rapidly; information occupations now employ over 40 percent of the total labor force. Included among information occupations are engineers, computer programmers, postal workers, lawyers, stock brokers, and writers.

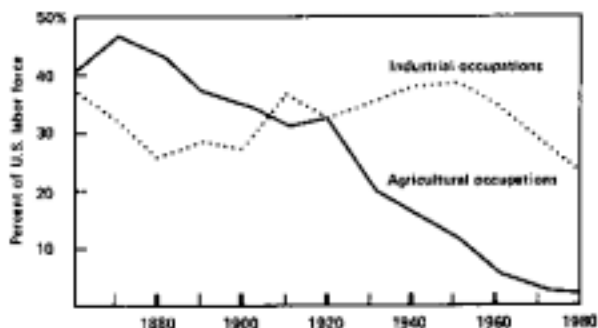
Meanwhile traditional information occupations are changing. Clerks who once used pencils and paper clips now use keyboards or video displays. The prices of these devices are changing rapidly, both absolutely and relative to alternative means.

Thus new choices arise as to the types and proportions of labor and capital inputs in the production of all goods and services.

RISING INFORMATION OCCUPATIONS



FALLING INDUSTRIAL AND AGRICULTURAL OCCUPATIONS

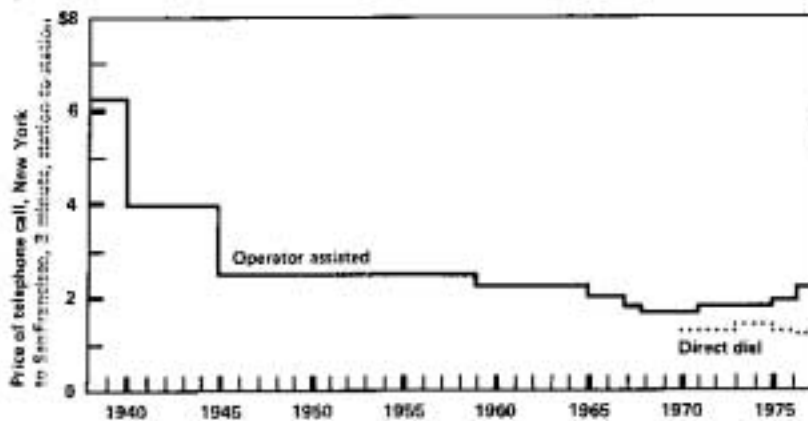


Differences among technologies

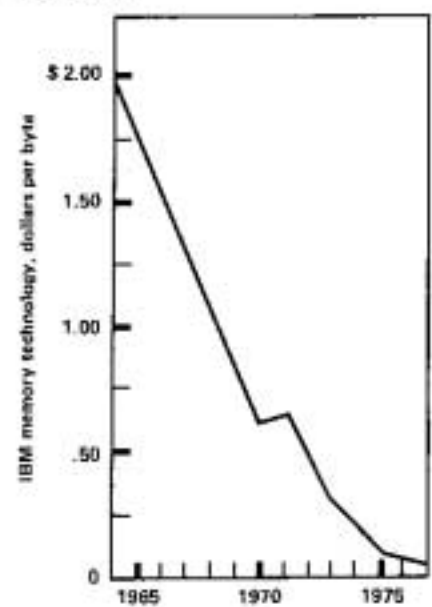
Mail, telephone, computers and television may be substituted for one another in a variety of information functions—advertising, for example. For users, the major absolute and relative changes in the prices of these resources open up choices as to the most effective and economical mix.

Spectacular advances in computer and communications (“communications”) technology are reflected in the falling prices of long distance telephone calls and of computer memories. On the other hand, increasing labor costs and stagnant mail volume in the labor intensive U.S. Postal Service are reflected in the rising price of letters. The dramatic increase in the price of advertising on broadcast television is due to the scarcity of broadcast channels. Technologically, that scarcity results from the limited available broadcast spectrum; politically, it flows in part from government restrictions of the growth of potentially unlimited cable television channels.

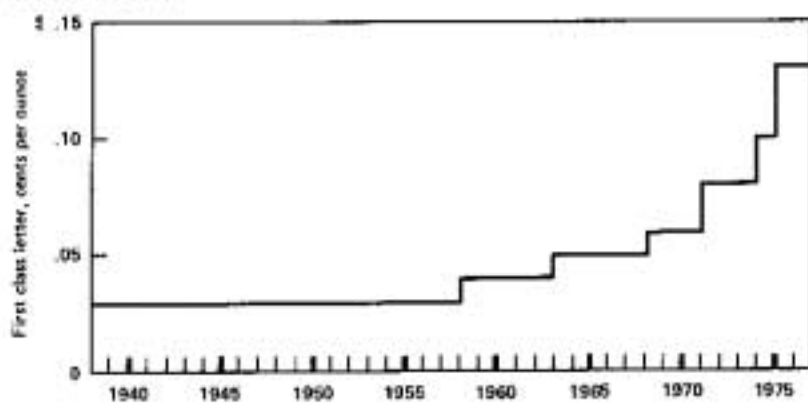
FALLING COST OF TELEPHONE CALLS¹



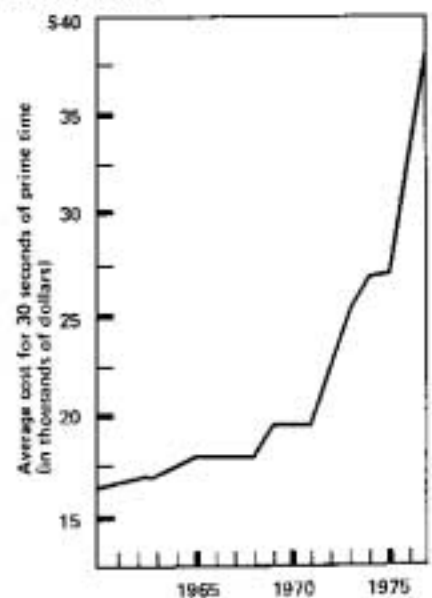
FALLING COST OF COMPUTER MEMORY²



RISING COST OF LETTERS³



RISING COST OF TELEVISION ADVERTISING⁴



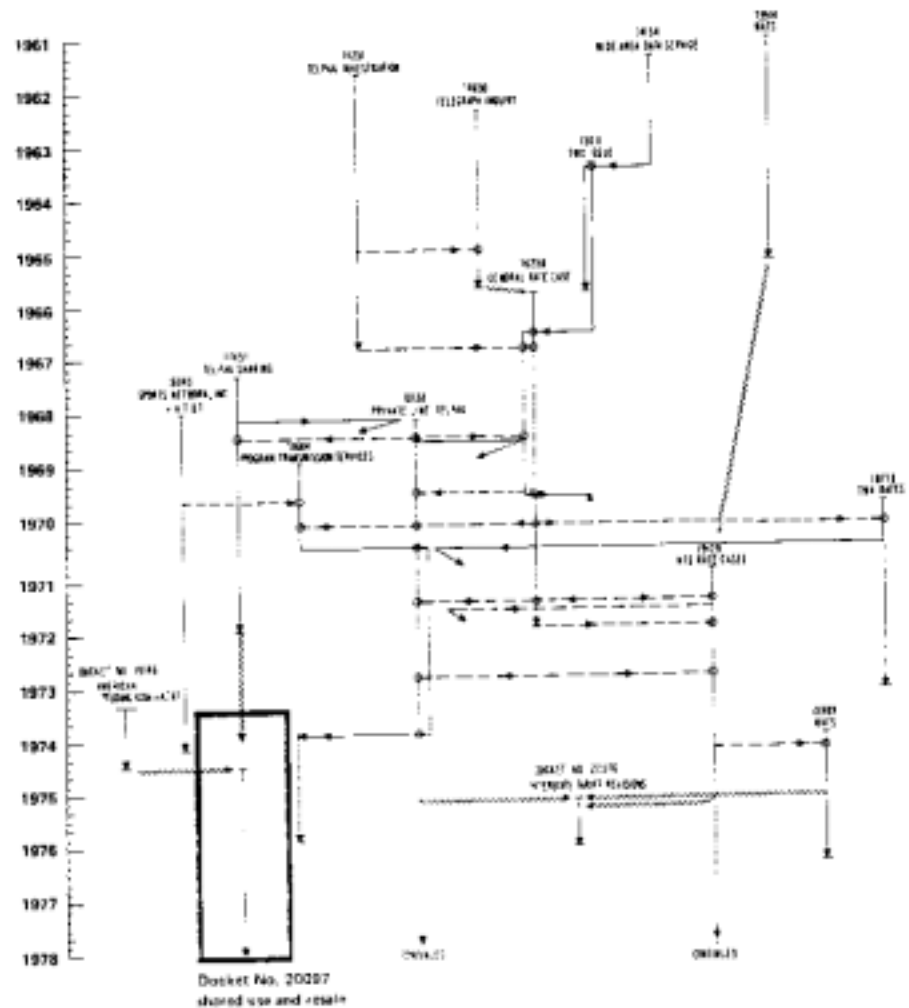
The tangled web of government regulation

Many everyday decisions are influenced by the price of local, instate, and interstate telecommunications. This price, in turn, depends on the politics of regulation by different political jurisdictions.

For example, in 1976, the interstate rate for an operator-assisted, person-to-person daytime call over a distance of 150 miles was \$4.30. This call cost the same within Pennsylvania, but \$3.55 or 17% less within New Mexico and \$5.30 or 23% more within Massachusetts.¹

The rates for a leased line also vary according to jurisdiction. For one part of this service (local loop connection), the monthly charges in early 1978 ranged from a low of \$3.50 for Pacific Telephone and Telegraph Co. service within California to a high of \$25.00 for AT&T interstate service—a seven-fold multiple.²

Originally, for interstate services, only those themselves able to fully use high capacity communications lines could take advantage of lower bulk rates. After nearly two decades of Federal Communications Commission decisions and court appeals, lower bulk rates are now more widely available—in theory. If they continue to be offered, high capacity lines can be shared by users or purchased by middlemen and sold piecemeal. This decision in FCC Docket No. 20097, *Shared Use and Resale*, is only one strand in the tangled regulatory web.



The telephone is over one hundred years old. Today, all businesses and 95.9% of households in the United States have at least one telephone¹ and revenues of the telephone industry were \$40.8 billion² in 1977.

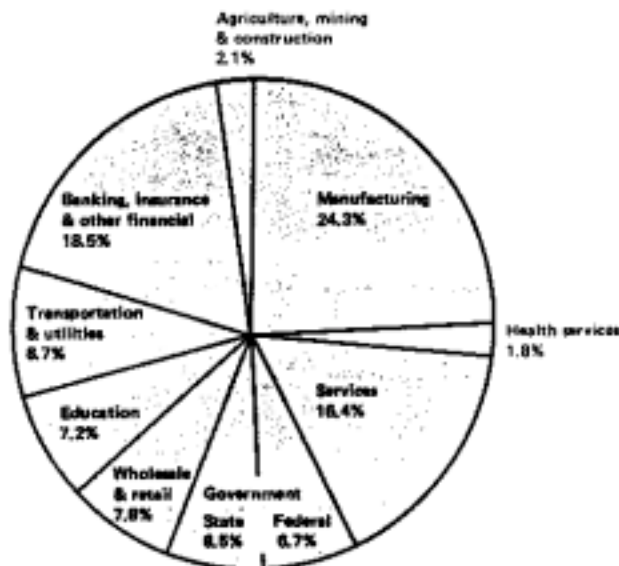
Computers were mere laboratory curiosities in the forties. As of 1977, general-purpose computers worth \$42 billion were spread across industry and government as shown in the chart below. Investment in computers is continuing at a high pace reflected in a 13.4% average annual growth rate of revenues of major computer systems manufacturers from \$14.2 billion in 1973 to \$23.5 billion in 1977.³

Already today, combined computer-and-communications (communications) technology offers users a wide range of choices about how to perform which information functions with what degree of integration and what cost and effectiveness tradeoffs. The basic question is how best to integrate—or not—traditional and electronic handling of transactions, of data processing, of office functions ("word processing"), of messages within and across organizations and of externally and internally generated information.

As a result, the computer and communications industries, championed by IBM and AT&T respectively, are increasingly competitive among themselves—and with others too. Their blurred boundaries are under government scrutiny. The future prices of communications goods and services thus depend on the extent to which competition will develop, and with what degree and kind of regulation.

DISTRIBUTION OF GENERAL-PURPOSE COMPUTERS BY INDUSTRY AND GOVERNMENT, UNITED STATES, 1977 (% OF INSTALLED BASE VALUE)⁴

© Copyright 1978 by International Data Corporation, reprinted by permission.



THE ANSWER IS YES ⁵

BARRON'S
NATIONAL BUSINESS AND FINANCIAL WEEKLY © DOW JONES & CO., INC.

Ma Bell vs. IBM?

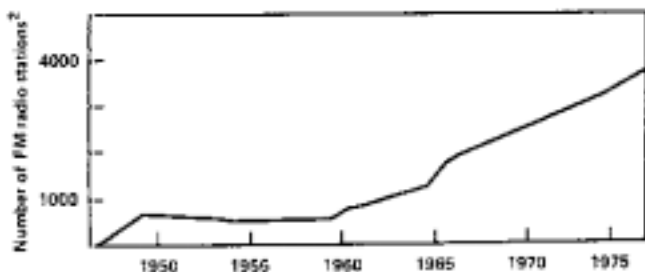
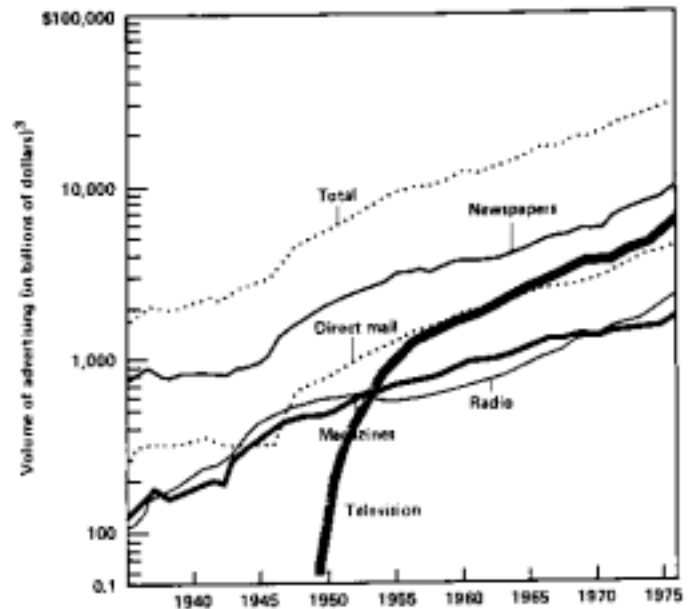
They Are Squaring Off at Each Other in Data Communications

**Choices among media:
Government influences**

Investments in different media are changing, witness the rising number of FM radio stations and the declining number of suburban—as well as central city—newspapers.

Choices among advertising media continue to grow. The apparent stability of advertising shares of the various media—except for the rise of television in the fifties—masks major competitive changes of mix. In surviving newspapers, for example, local retail and classified advertising have risen relative to national advertising and newspapers now carry more and more flyers inserted among their sections as a response to competition from direct mail advertising and from private merchant delivery. Radio has relinquished national mass advertising to TV and become increasingly attractive to advertisers aiming at narrow segments of the public.

Among the factors influencing the relative prices of advertising through various media are prices of second class mail (magazines and newspapers), of third class mail (direct mail advertising) and of telephone calls. In addition government regulates how much competition may occur between broadcast and cable television and how far common ownership may extend over newspapers, telephone companies, radio stations, television stations and cable television systems.

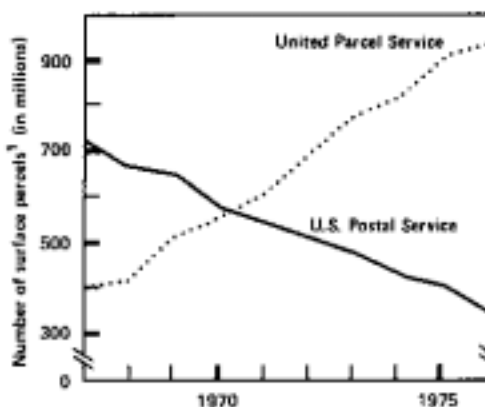


Choices among "postal" services

Between 1971 and 1976, the U.S. Postal Service invested nearly \$1 billion in a Bulk Mail System for handling parcels and bulk shipments of magazines, advertisements and the like. By reducing processing costs and improving service, this system was intended to help the United States Postal Service compete with the private United Parcel Service. But, by the time the system was fully operating, shippers had switched most of their small parcel business to the United Parcel Service (figure below). With its overbuilt system "[i]f parcel volume declines as anticipated by the Postal Service, the rate of return will diminish, *perhaps to no return at all on investment,*"¹ thus fueling continuing controversies over whether the Postal Service should be a self-sustaining "business" or a tax-supported "public service."

Currently the Postal Service is experimenting with a so-called Electronic Message System to move messages electronically over long distances for conventional local delivery. The systems being considered would cost between 1 and 1.5 billion dollars, handle 20 to 24 billion messages at substantial savings over the price of letters, and be deployed nationwide by 1990. However, many of the messages this system is designed to process are billing statements that might be eliminated or at least significantly reduced in number by 1990 by the all-Electronic Funds Transfer Systems (EFTS) that banks are planning to offer for money management by their corporate customers.

Would a Postal Service Electronic Message System replicate the experience of the Bulk Mail System? With what effects on all the users of the Postal Service, the taxpayers, and the nearly 700,000 heavily unionized postal employees?



In the information industries, traditional assumptions and practices—covering markets, products, competitors, consumers, regulation, production techniques, and industry structures—have been undermined by new technology and by competition across blurring boundaries of industries and markets. Resulting upheavals are reflected in a welter of interrelated bills and study commissions such as the Consumer Communications Reform Bill, the Freedom of Information Act, the Communications Bill of 1978, the Postal Service Bill, the National Intelligence Reorganization and Reform Bill, the General Revision of the Copyright Law, the Privacy Act, the National Commission on Electronic Fund Transfers, and the Privacy Protection Study Commission.

Common to all these instances are user and supplier stakes in the rise or fall of information resource prices and in growing choices among these resources. For example, alternatives to the public Postal Service now include the private United Parcel Service, inserts in newspapers, and merchandise samples hung on door knobs (which avoids unlawful use of mail slots).

Although market factors play some role in the pricing of these alternatives, the determination of the costs to be recovered through pricing is a controlling factor, witness the description below of a "Basis for Apportionment of Postal Service Costs." Mailmen deliver all classes of mail and the wires from house or office to telephone exchange carry all kinds of calls. Thus the costs of mailmen and of wires are joint or common to all the services they provide. Such joint or common costs are the bulk of costs in all information industries and the processes for apportioning them among particular goods or services are heavily political.

**H.R. 7700—POSTAL SERVICE ACT
OF 1978¹**

**BASIS FOR APPORTIONMENT OF POSTAL SERVICE COSTS AND
PUBLIC SERVICE APPROPRIATIONS**

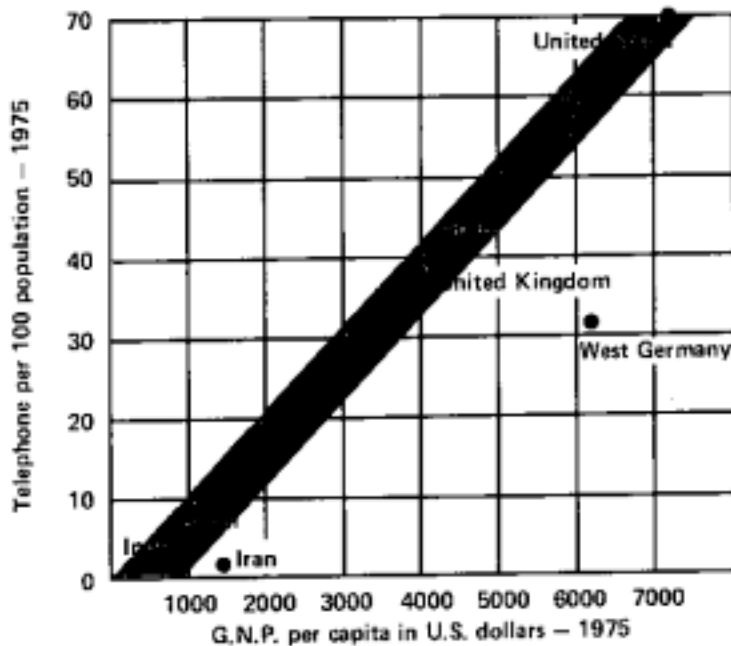
- A** The quality and character of the mail service provided to both the sender and the recipient, including collection, speed of transmission, privacy, and priority of handling and delivery;
- B** the effect of the proposed rates on the general public, business mail users, and enterprises in the private sector of the economy engaged in the delivery of mail matter other than letters;
- C** the available alternative means of sending and receiving letters and other mail matter at reasonable costs;
- D** the educational, cultural, scientific, and informational benefit of the mail matter to the Nation; and
- E** the relative demand for each class or subclass of mail or type of mail service.

Telecommunications and economic clout go up together

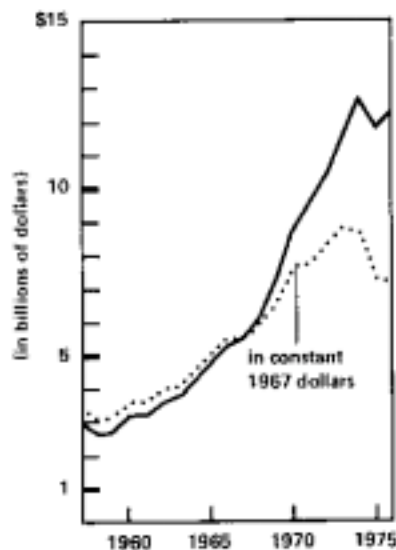
GNP per capita and the number of telephones per 100 people usually move up together, but views on the causal connection are shifting. According to John Magee, president of Arthur D. Little, Inc., in 1977 testimony to the Senate Foreign Relations Committee, "By the traditional yardstick, telecommunications follows industrial development, rather than precedes it. This is now an outmoded thesis... There is growing recognition today of telecommunications more as a precondition than as a consequence of industrial and social development."

Continuing high United States investments in telecommunications are reflected not only in construction of public facilities by telephone companies but also in the purchase of private equipment—which the federal government now permits. In hot dispute is the likely effect of new competition on future telecommunications prices for big business and small, for urban residences and for rural residences.

TELEPHONES AND ECONOMIC CLOUT GO UP TOGETHER ¹



TELEPHONE CONSTRUCTION EXPENDITURES ²



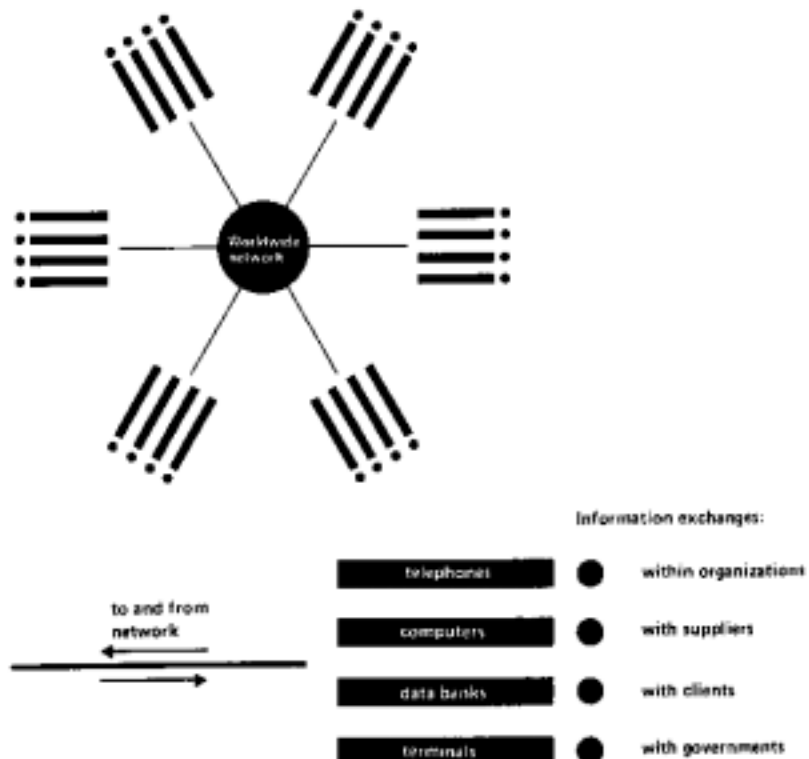
4

Changing Control

Corporate management: Flexible choices

In today's world of telecommunications a Polish airline clerk in Warsaw makes instant seat reservations using a computer located in Atlanta, Georgia, and the ocean liner Queen Elizabeth II carries a satellite dish.

Nearly instantaneous access to people and records through telecommunications networks enables flexible organizational control. Whether local, regional, national or international, this easy access allows monitoring and coordination of routine activities and gives rise to a wide range of operating styles and preferences. Before, these styles and preferences were less flexible. But now they can be adjusted with much greater speed to fit the nature and importance of decision-making.



Typical information exchange and transmission methods of any organization, e.g., government agencies, corporations, individuals, etc.

**Corporate management:
New opportunities**

"Global exports in 1976 were \$980 billion which is 12.6% higher than the year before. A large part of that total was financed through trade credits arranged by banks, and all of it triggered some kind of international financial transaction which depended on the world's communication media."¹

Robert B. White, Executive Vice President, Citibank, N.A., Congressional Testimony, June 10, 1977.

**GENERAL ELECTRIC'S MARK III
TELEPROCESSING NETWORK²**



**GLOBAL BANK NETWORK
(SOCIETY FOR WORLDWIDE
FINANCIAL TELECOM-
MUNICATIONS)¹**



"It was not until our technological intelligence, through space photography and electronics, enabled our Director of Central Intelligence to assure our President and our Congress in 1972 that we could monitor strategic arms limitations, that we were able to make the SALT (Strategic Arms Limitations Talks) Agreement of that year. A feature of that agreement was the mutual undertaking by the Soviets and the United States not to develop nationwide anti-ballistic missile systems. We have not done so, and we know the Soviets have not done so, and out of this we have saved our taxpayers something between \$50 and \$100 billion, which we would otherwise have had to spend in these past few years."¹

William E. Colby, Congressional Testimony, June 8, 1977.

CARTER SIGNS ORDER TO FIGHT PHONE SPIES

Program Will Increase Research
and Rout Messages Underground
to Block Soviet Surveillance

President Carter has approved a broad Government program to make it more difficult for the Soviet Union, other nations or businesses to eavesdrop on telephone communications in the United States.²

The New York Times, November, 1977.

The business stake in Soviet snooping

"... U.S. Administration officials say that this eavesdropping threatens to expose commercial and business secrets as well as those involving national security. . . . Such interceptions have been going on for at least five years, but Washington has not acknowledged them publicly. What has changed is the new emphasis on nondefense secrets."³

Business Week, December, 1977.

THE COMING "INFORMATION WAR"

*Censorship, Restrictions on Data Flow
A Growing Threat to U.S. Interests¹*

The Washington Post, January 1978.

Press Worried by Third World's Move to Restrict Flow of News

A major movement appears to be under way by third-world and Latin American countries that would restrict the free flow of news reporting in and out of these areas and eventually replace it exclusively with government-controlled information...²

The New York Times, July, 1976.

Going, Going, Gooooonnnne: The dangers of exporting design and manufacturing knowledge and skill to other countries

Exporting design and manufacturing know-how to potential enemies strengthens them militarily. And exporting that same know-how to potential economic competitors—friends or foes—strengthens them to compete against us for world markets. Yet we continue to transfer know-how by many means.³

The New York Times, September, 1976.

U.S. Draws Up Plans for War in Space

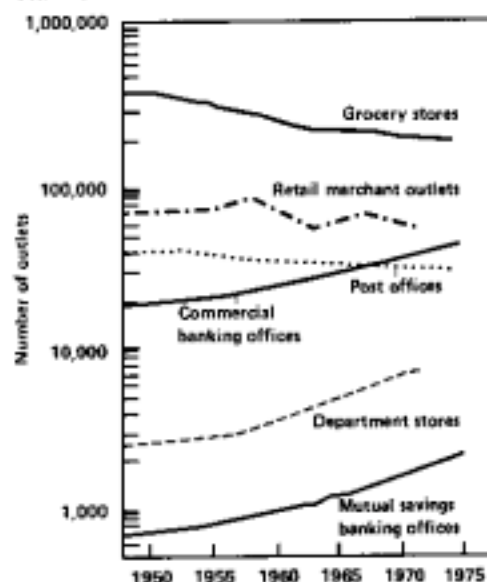
Particularly vulnerable to attack are the communications satellites, strung out like beads around the globe...⁴

The Washington Post, January, 1977.

New technology and changing costs have intensified battles over control of money flow. The chart only covers industries already active in this marketplace. Other likely entrants include finance companies, national credit systems, reservation and ticket agencies.

Courts have been drawn into battles in which judges are asked to decide: When an electronic terminal automatically dispenses cash, accepts payments, verifies balances, and does other financial transactions too, should the terminal be considered a branch of a bank?

OUTLETS FOR FINANCIAL TRANSACTIONS¹



Sears, Roebuck: Nation's Banker?

The New York Times Magazine, November, 1976.²

Girard Bank Offers Payment of Bills By Using Telephone

Customers Also Can Check Balances, Transfer Money Or Borrow on Credit Card

The Wall Street Journal, March, 1978.³

Girard Bank Hits Snag in Plan to Start Bill-Paying by Phone

Firm Finds FCC Bars Using Device Sold to Customers To Send Electronic Signals.
The Wall Street Journal, March, 1978.⁴

The Death Of Mail?

Outgoing Postmaster Says Electronics Will Prevail

Evening Independent, March, 1978.⁵

The computer society

Individual acceptance or rejection of innovation is an important factor governing change.

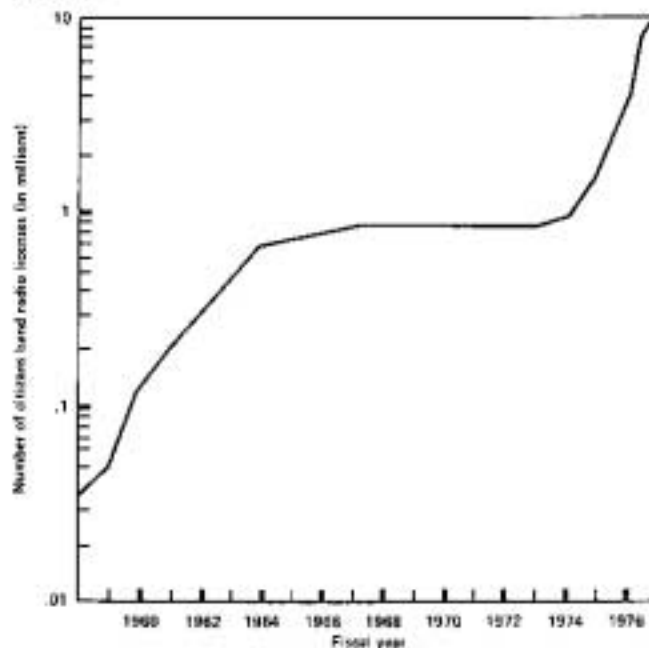
What *Time* calls the Computer Society is reflected in growing personal use of hand-held calculators, touch-tone telephones, TV game devices, CB radios, digital watches, and personal computers. As *The New Yorker* has reported, "More than a hundred computer clubs have sprung up, some with as many as a thousand members. The kids, especially, are mad about the personal computer. What you have here is a genie."¹ Electronic information displays and keyboards already are the workaday tools of newspaper reporters, telephone operators, bank and insurance company clerks, department store and supermarket cashiers, and hotel, airline and rent-a-car reservation takers.

As the president of one of the Harvard Program's affiliates put it to his stockholders: "All of these devices accelerate general familiarity with handling information in other than printed form. They cannot help but encourage people increasingly to use video and other devices to acquire information and act on it. We want to be ready to have the information we generate, or can acquire, available in whatever alternative forms the public finds desirable."²



© Copyright 1978 Time Inc. All rights reserved.

GROWTH OF CITIZENS BAND RADIO *



**Questions are beginning
to be asked**

In June 1977, the Senate Foreign Relations Subcommittee on International Operations held hearings on "the role of the news media, business, banking, labor, national security and government in international communications matters." Senator George McGovern of South Dakota, the chairman of the subcommittee, in an editorial in *The New York Times*, wrote:

"We don't yet know the implications of the information age. Maybe one of the reasons the United States does not have an overall international communications policy or set of goals—and there appears to be no drive to develop them—is that we don't even know the right questions to ask."¹

THE INFORMATION AGE



© Copyright The New York Times, 1977.
Brad Holland

 **Information costs**

Included in the table on pages 32 and 33 are only industries whose products, like paint, livestock or cars, are not themselves information products. Information industries like newspapers, brokerage services or education are excluded.

The table presents industry-by-industry estimates of the information costs per dollar of revenues from sales of the non-information products. The figures are derived from data for 1967 developed in a U.S. Department of Commerce report, *The Information Economy*, issued in 1977. To the best of our knowledge, no more recent estimates were available as of mid-1978.

The first column of the table displays the estimate of what each industry spent in 1967 on the information resources it needed in order to produce its non-information product. The amount includes purchases from outside the industry plus internal expenses for wages of information workers and for capital consumption allowances or depreciation for information machines such as computers, copiers, or printing presses.

Sales for each industry are shown in the second column. In instances where an industry sells both non-information products and information products, only sales of non-information products are included. The amusements industry, for instance, supplies both information products, like movies, and non-information products like golf courses. Of this industry's total sales of \$9 billion in 1967, \$4.7 billion were of non-information products.

The third column is the ratio of the first column to the second column.

Additional definitions and precise citations for the sources of the data follow the chart on page 33.

INDUSTRY (I-O NUMBER) ^a	1967 Expenses for information resources by firms in the industry (in \$ millions) ^b	1967 Sales of non-information products of firms in the industry (in \$ millions) ^c	1967 Information costs per dollar of revenues (in %) ^d
All industries	213,755	1,111,347	.19
Wholesale & retail trade (59)	58,350	140,682	.42
Medical, educational services & nonprofit organizations (77) ^e	8,832	23,990	.37
Ordnance & accessories (munitions) (13) ^f	3,784	10,733	.35
Aircraft & parts (60) ^f	7,304	21,993	.33
Drugs, cleaning & toilet preparations (29)	4,040	12,582	.32
Professional, scientific & controlling instruments & supplies (62) ^g	517	1,802	.29
Amusements (76) ^g	1,313	4,727	.28
Optical, ophthalmic & photographic equipment & supplies (63) ^g	125	470	.27
Maintenance & repair construction (12)	4,157	15,707	.26
Electric transmission & distribution equipment & electrical industrial apparatus (53) ^f	2,197	8,448	.26
Machine shop products (50)	980	3,940	.25
Paper & allied products except containers & boxes (24) ^g	3,080	12,714	.24
Special industry machinery & equipment (48)	1,094	4,728	.23
Miscellaneous electrical machinery, equipment & supplies (58)	870	2,892	.23
Miscellaneous manufacturing (54)	1,748	7,702	.23
New construction (11)	14,856	67,708	.22
Metalworking machinery & equipment (47)	1,905	8,876	.22
Household appliances (54)	1,196	5,450	.22
Electric lighting & wiring equipment (55)	890	4,118	.22
Paints & allied products (30)	597	2,914	.21
Glass & glass products (35)	797	3,801	.21
Materials handling machinery & equipment (46)	525	2,538	.21
General industrial machinery & equipment (49)	1,661	7,800	.21
Transportation & warehousing (65)	11,316	52,825	.21
Construction, mining, oil field machinery equipment (45)	1,187	5,974	.20
Paperboard containers & boxes (25)	1,190	6,031	.20
Other furniture & fixtures (23) ^g	334	1,750	.19
Stone & clay products (36)	2,094	11,026	.19
Rubber & miscellaneous plastic products (32)	2,487	13,809	.18
Heating, plumbing, & fabricated structural metal products (40)	2,196	12,510	.18
Stone & clay mining & quarrying (9)	391	2,355	.17
Household furniture (22)	853	5,122	.17
Screw machine products, bolts, nuts, etc., & metal stamping (41)	1,578	9,293	.17
Other fabricated metal products (42)	2,179	12,519	.17
Farm machinery (44)	835	4,826	.17
Service industry machines (52)	904	5,279	.17
Chemicals & selected chemical products (27)	3,558	22,806	.16
Plastics & synthetic materials (28)	1,359	8,424	.16

INDUSTRY (I-O NUMBER) ^a	1967 Expenses for information resources by firms in the industry (in \$ millions) ^b	1967 Sales of non- information products of firms in the industry (in \$ millions) ^c	1967 Information costs per dollar of revenues (in %) ^d
Footwear & other leather products (34)	678	4,240	.16
Metal containers (39)	541	3,388	.16
Engines & turbines (43)	616	3,828	.16
Other transportation equipment (61)	1,227	7,811	.16
Automobile repair & services (75)	2,294	14,758	.16
Hotels & lodging places, personal & repair services, except automobile repair (72)	2,879	19,388	.15
Crude petroleum & natural gas (8)	2,124	15,031	.14
Apparel (16)	3,140	22,586	.14
Wooden containers (21)	74	543	.14
Primary iron & steel manufacturing (37)	4,448	31,723	.14
Iron & ferroalloy ores mining (5)	220	1,744	.13
Nonferrous metal ores mining (8)	207	1,640	.13
Agricultural, forestry, & fishery services (4)	332	2,670	.12
Coal mining (7)	381	3,163	.12
Chemicals & fertilizer mineral mining (10)	125	1,027	.12
Food & kindred products (14)	10,503	88,481	.12
Miscellaneous fabricated textile products (19)	505	4,283	.12
Miscellaneous textile goods & floor coverings (17)	501	4,668	.11
Lumber & wood products, except containers (20)	1,475	12,905	.11
Petroleum refining & related industries (31)	2,801	26,875	.11
Motor vehicles and equipment (59)	4,620	43,740	.11
Real estate and rental (71) ^e	9,435	86,713	.11
Leather tanning & industrial leather products (33)	111	1,090	.10
Primary nonferrous metals manufacturing (38)	2,072	20,870	.10
Tobacco manufacturers (15)	724	7,840	.09
Broad & narrow fabrics, yarn & thread mills (18)	1,506	15,966	.09
Electric, gas, water & sanitary services (68)	3,401	37,321	.09
Other agricultural products (2)	2,280	28,540	.08
Forestry & fishery products (3)	90	1,845	.06
Livestock & livestock products (1)	898	30,638	.03
Business travel, entertainment & gifts (81)	343	11,208	.03

a The estimates in the table are for industries as classified by the U.S. Department of Commerce for input-output analysis. The numbers in parentheses are the I-O identification numbers assigned by the Department. For detailed descriptions and definitions, see U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, "The Input-Output Structure of the U.S. Economy: 1967," Washington, D.C., February 1974, Vol. 64, No. 2, p. 24-37 and *Definitions and Conventions of the 1967 Input-Output Study*, October 1974. The I-O numbers are not the same as the SIC (Standard Industrial Classification) numbers. Industry definitions also differ somewhat between the two systems.

b Marc Uri Parat, *The Information Economy: Vol. 3, The Interindustry Transactions Matrices (1967)*, U.S. Department of Commerce, Office of Telecommunications, Washington, D.C., May 1977, p. 16.

c *Ibid.*, p. 51-52.

d *Ibid.*, Vol. 4, *The Technology Matrices (1967)*, p. 77, 81, 85-86, 90, 98, 102, 106-107, 111.

e In *The Information Economy*, this industry is divided in two segments. Only the non-information segment is represented in the table.

f The figures for this industry exclude sales of research and development to final consumers (final demand). Most non-information industries produce R & D only for internal consumption, but this particular industry sells a significant amount to final consumers—usually the federal government.

Notes

- page 6
1. Alfred D. Chandler, Jr. *The Visible Hand: The Managerial Revolution in American Business*, Belknap Press of Harvard University Press, Cambridge, Massachusetts, 1977, p. 491.
 2. IBM Corporation, advertisement in *Newsweek*, May 16, 1977, p. 14.
- page 7
- a. Government statistics are routinely compiled for this industry but are not yet available for this year.
 - b. Industry statistics consistent with those for the following years are not available.
 - c. Major league sports are as intimately linked to the television industry as motion picture production and therefore qualify for inclusion. The organizations are, however, generally privately held and, except for a rare special study, data about them are not available.
 - d. Statistics are routinely compiled for only some types of libraries.
 - e. Figures are not normally released by the government but became available for prior years through Congressional hearings.
 - f. National Technical Information Service.
- page 8
1. Marc Uri Porat. *The Information Economy: The Interindustry Transactions Matrices (1967)*, Vol. 3, U.S. Department of Commerce, Office of Telecommunications, Washington, D.C., May 1977, pp. 16, 51-52, and *The Information Economy: The Technology Matrices (1967)*, Vol. 4, pp. 77, 81, 85-86, 90, 98, 102, 106-107, 111.
- page 9
1. Porat. *The Information Economy: Definition and Measurement*, Vol. 1, Table 9.1, p. 150.
- page 10
1. Raymond Vernon. *Storm over the Multinationals: The Real Issues*, Harvard University Press, Cambridge, Massachusetts, 1977, p. 2.
 2. Otto Almasy, Vice President, Transamerica Insurance Group, personal communication, July 7, 1978.
 3. Senator Ernest F. Hollings, speech before the Computer and Communications Industry Association, Washington, D.C., February 28, 1978.
- page 11
1. Milton R. Benjamin and William H. Read. "Ma Bell Fights for Her Monopoly," *New York Times Magazine*, November 28, 1976, Section 6.
- page 12
1. John C. LeGates, testimony before the U.S. House of Representatives, Committee on International Relations, Subcommittee on International Operations, June 24, 1977, pp. 383-393.
- page 14
1. Porat. *The Information Economy: Definition and Measurement*, Vol. 1, Figure 7.2, p. 121.
- page 15
1. National Science Foundation. *Research and Development in Industry, 1974*, U.S. Government Printing Office, Washington, D.C., September 1976, Table B-26, p. 55.

2. National Science Foundation. *Science Indicators*, 1976, U.S. Government Printing Office, Washington, D.C., Figure 4-5, p. 98.
- page 16
1. American Telephone & Telegraph Co., personal communication, April 20, 1978.
 2. International Data Corporation. *Worldwide Industry Seminar*, 1977, Waltham, Massachusetts, p. H-23.
 3. U.S. Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970*, Bicentennial Edition, Part 2, U.S. Government Printing Office, Washington, D.C., 1975, Series R 188, p. 807, and U.S. Bureau of the Census, *Statistical Abstract of the United States*, 1976, 97th Edition, U.S. Government Printing Office, Washington, D.C., Table 872, p. 531.
 4. Columbia Broadcasting, Inc., personal communication, May 8, 1978.
- page 17
1. Adapted from National Association of Regulatory Utility Commissioners. *Long Distance Message Toll Telephone Rates in Effect August 31, 1976*, Washington, D.C., 1976.
 2. *Trends in Communications*, Vol. 3, No. 5, April 1, 1978, pp. 4-5.
- page 18
1. American Telephone & Telegraph Co., Comptroller's Accounting Division. *Bell System Statistical Manual*, May 1977, § 500 Telephones, p. 504.
 2. Federal Communications Commission, Common Carrier Division, Economic Studies Branch, personal communication, May 30, 1978.
 3. International Data Corporation, personal communication, April 10, 1978.
 4. *Ibid.*
 5. *Barron's*, February 9, 1976, p. 3.
- page 19
1. American Newspaper Representatives, Inc., May 1978.
 2. Television Digest, Inc. *Television Factbook: Services Volume*, No. 47, Washington, D.C., 1978, p. 67-a.
 3. Adapted from McCann-Erickson Advertising Agency, Inc., New York, N.Y., 1978, compiled for Crain Communications, Inc.'s *Advertising Age*.
- page 20
1. Commission on Postal Service. *Report*, Vol. 1, April 1977, p. 15.
 2. Commission on Postal Service. *Report*, Washington, D.C., April 1977, p. 15, and U.S. Postal Service, Market Research Division, personal communication, May 5, 1978.
- page 21
1. H.R. 7700, 95th Congress, 2nd Session, § 3622 (1978).
- page 22
1. Based on a graph appearing in *Fortune*, Vol. XCVI, No. 2, August 1977, p. 147.
 2. Adapted from American Telephone & Telegraph Co. *Bell System Statistical Manual*, p. 2 and § 600 Plant, p. 606, and U.S. Independent Telephone Association. *Independent Telephone Statistics*, Vol. 1, Washington, D.C., July 1977, p. 12.

- page 24
1. Robert B. White, Executive Vice President, Citibank, N.A., testimony before the U.S. Senate, Foreign Relations Committee, Subcommittee on International Operations. Hearings on International Communications and Information, June 10, 1977, p. 247.
 2. General Electric Co., 1978.
 3. Society for Worldwide Interbank Financial Telecommunication (SWIFT). *General Information*, 2nd Edition, Brussels, Belgium, January 1977, p. 2.
- page 25
1. William E. Colby, testimony before the U.S. Senate, Committee on Foreign Relations, Subcommittee on International Operations. First Session on the Implications of International Communications and Information, June 8, 1977, p. 18.
 2. *New York Times*, November 20, 1977.
 3. *Business Week*, December 12, 1977, pp. 57-58.
- page 26
1. *Washington Post*, January 15, 1978.
 2. *New York Times*, July 19, 1976, p. 7.
 3. *New York Times*, September 11, 1976, p. 19.
 4. *Washington Post*, January 10, 1977, pp. A1, A26.
- page 27
1. Grocery stores: *Progressive Grocer*, "43rd Annual Report of the Grocery Industry," Vol. 55, No. 4, April 1976, p. 76.
Retail merchant outlets and department stores: Adapted from U.S. Bureau of the Census. *Census of Retail Trade, 1972*, Washington, D.C., Table 2a, pp. 1-68.
Commercial and mutual savings banking offices: Federal Deposit Insurance Corporation. *Annual Report, 1974*, and earlier editions, Washington, D.C., Tables 102 or 103.
Post offices: U.S. Bureau of the Census. *Historical Statistics of the United States: Colonial Times to 1970, Part 2, Series R 163*, p. 804 and *Statistical Abstract of the United States, 1975*, 96th Edition, Table No. 842, p. 511.
 2. *New York Times Magazine*, November 28, 1976.
 3. *Wall Street Journal*, March 13, 1978.
 4. *Wall Street Journal*, March 17, 1978.
 5. *Evening Independent*, St. Petersburg, Florida, March 3, 1978.
- page 28
1. *The New Yorker*, "Talk of the Town," November 14, 1977.
 2. Otto A. Silha, President, Minneapolis Star and Tribune Co., as stated to annual stockholders' meeting, May 17, 1978.
 3. *Time*, Vol. 111, No. 8, February 20, 1978, cover.
 4. Federal Communications Commission, Safety and Special Radio Services, personal communication, April 14, 1977.
- page 29
1. *New York Times*, June 9, 1977.

10/10/10