

INCIDENTAL PAPER

**Information Technologies,
Government and Governance:
Some Insights from History**

**Anthony G. Oettinger
September 1998**

***Program on Information
Resources Policy***



Center for Information Policy Research



Harvard University

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Information Technologies, Governance and Government: Some Insights from History

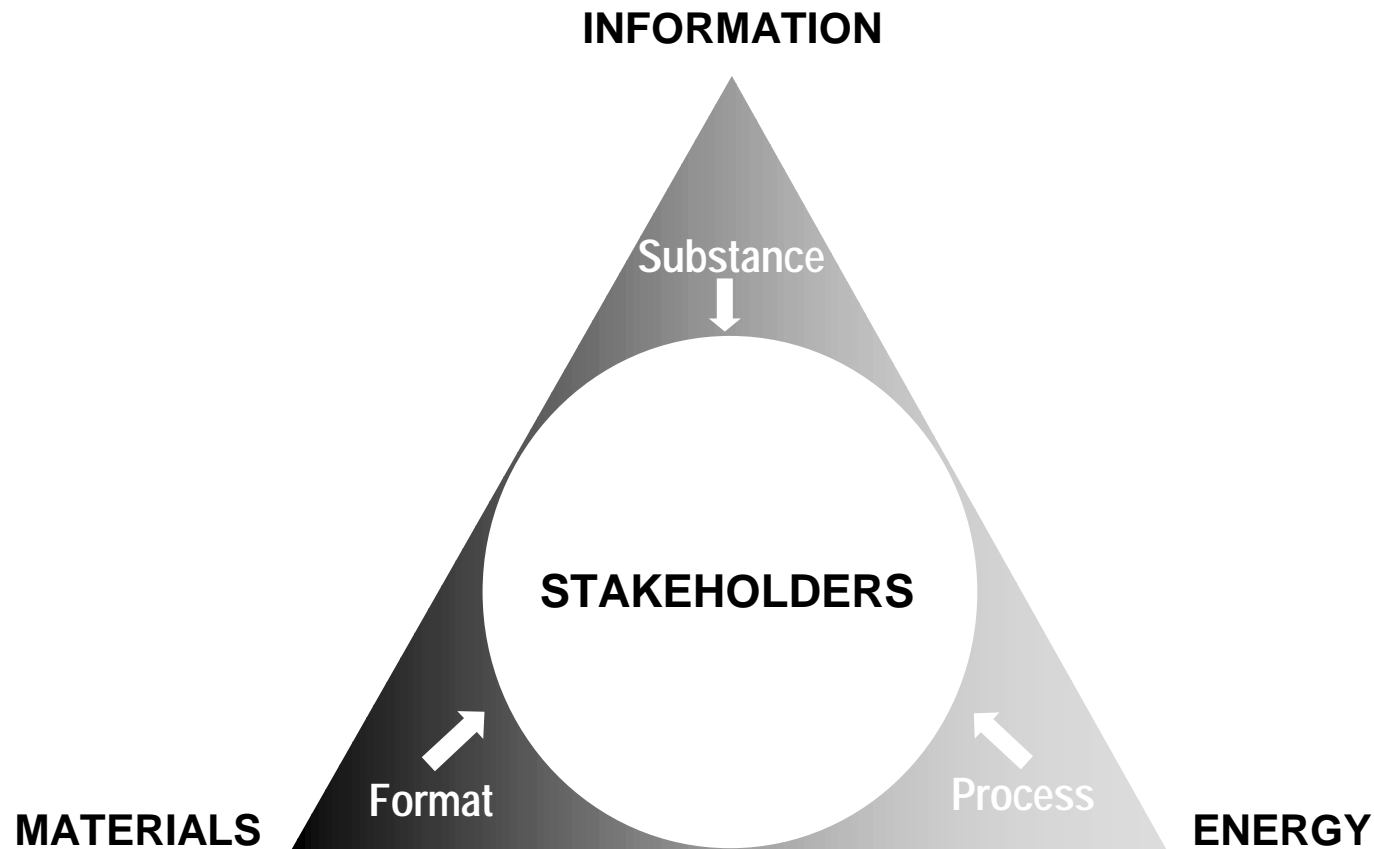
Anthony G. Oettinger

**Professor of Information Resources Policy, FAS
Chairman, Program on Information Resources
Policy (PIRP)**

Bretton Woods, New Hampshire

Monday, July 20, 1998

Information as a Resource



- *Without materials, nothing exists*
- *Without energy, nothing happens*
- *Without information, nothing makes sense*

The two specific questions:

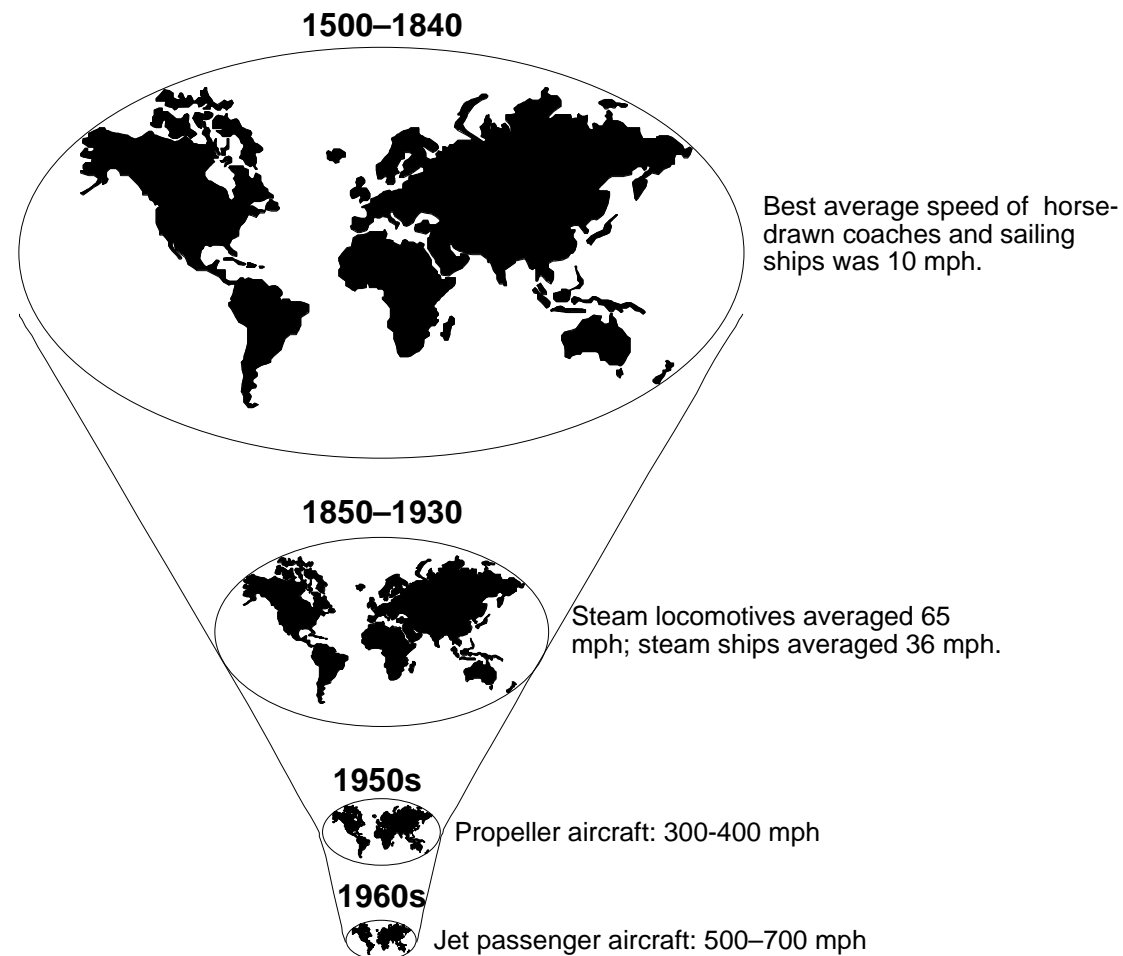
- 1) How did earlier changes in information technologies affect governance and government?
e.g., printing press, telegraph, radio, television?
- 2) What lessons can be drawn for the current period?

Technology improvements open opportunities

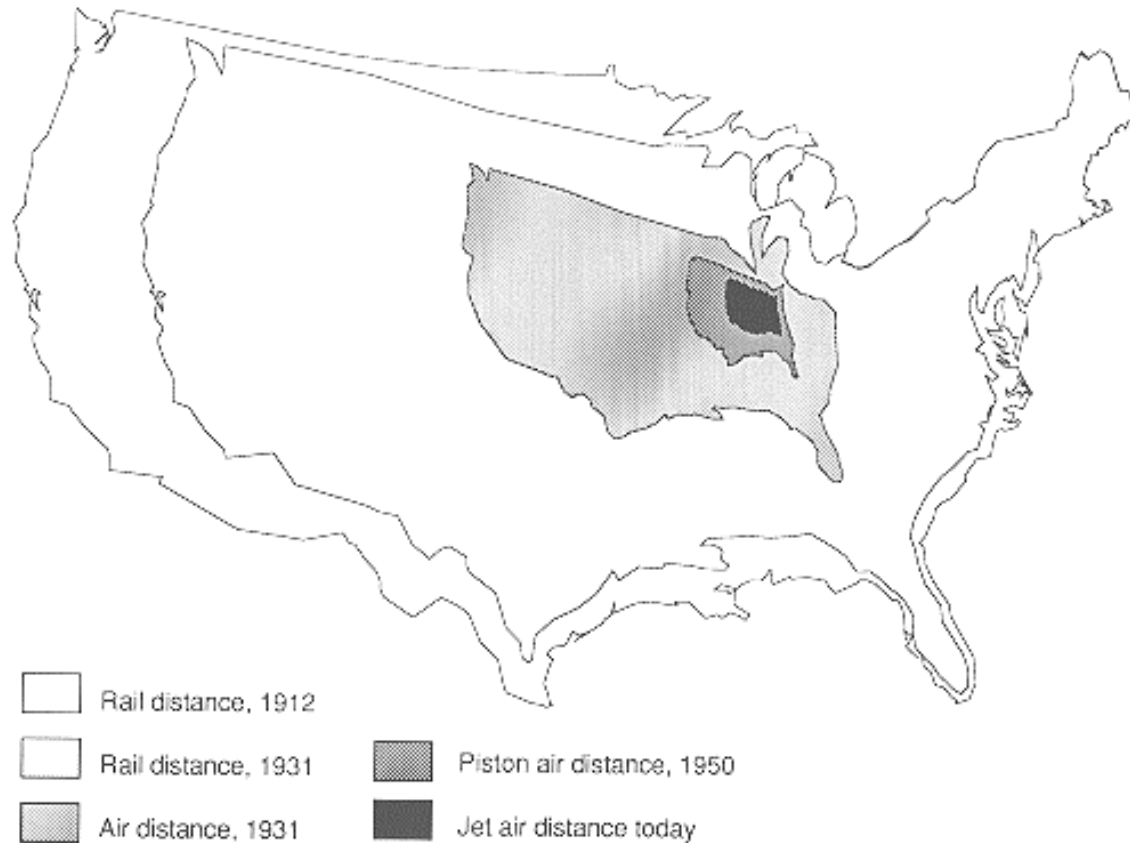
Areas of Opportunity	Technology Improvement Trends			
	Smaller	Faster	Cheaper	Better
Products	Smart Weapons			
Applications		Weather Forecasting		
Markets			Personal Computers	
Strategies				Japanese Color TVs

Adapted from: John C. LeGates and John F. McLaughlin, *Forces, Trends and Glitches in the World of Communications* (P-89-2, 1989), Figure 13, 22. © 1989 President and Fellows of Harvard College, Program on Information Resources Policy.

The shrinking world: The impact of transportation technology on effective distance



The shrinking United States: Transportation and effective distance 1912–1970



Source: John C. Lowe and S. Moryadas, *The Geography of Movement* (Boston: Houghton Mifflin, 1975), 51; reprinted with permission in Vincent Mosco, *Will Computer Communication End Geography?* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-95-4, 1995).

Is significant change in information technologies truly self-evident?

Like the judiciary on pornography, do we know it when we see it?

- Reconsider transportation technologies—around for millennia
- Consider the fax machine—ubiquitous only as of the late 1990s

Speed of information transfer instruments

670,000,000 mph	Electronic: telegraph, telephone, radio
670,000,000 mph	Visual: semaphores, bonfires, smoke signals
660 mph	Sonic: drums, horns, whistles
100–600 mph	Aircraft
60 mph	Carrier pigeon
30–60 mph	Vehicle: motorcycle, automobile, truck, railroad
15–30 mph	Ship
9 mph	Horse: postrider, coach
6 mph	Human

What are technologies anyway?

Neither stage coaches

per se

Nor jet planes

per se

are useful technologies



Useful technologies encompass both instruments and people in systems and organizations.

In the real world, technology, economy, and polity are inextricably intertwined by their interactions.

When is a technology ready?

- In the laboratory?
- As a manufacturable prototype?
- For niche markets?
- For mainstream markets?
- For the onslaught of competitors?
- For prime-time production scale?
- For political consciousness of its potential?

Predicting the advent of fax: Who said this? When?

"The probable simplification of the fac-simile [sic] system of Caselli, by which an exact copy of anything that can be drawn or written may be instantaneously made to appear at a distance of hundreds of miles from the original; and the countless other applications of electricity to the transmission of intelligence yet to be made,—must sooner or later interfere most seriously with the transportation of letters by the slower means of post."

Predicting the advent of fax: Crying *wolf* at least 126 years too soon!

- And the source is...
- *Annual Report of the Postmaster-General of the United States. The Fiscal Year Ended June 30, 1872* (Washington: Government Printing Office, 1872).

Is the technology ready?

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Is the technology ready?

- In the laboratory?
- As a manufacturable prototype?
- For niche markets?
- **For mainstream markets?**
- **For the onslaught of competitors?**
- **For prime-time production scale?**
- **For political consciousness of its potential?**

Predicting the advent of fax: Clueless at five minutes to midnight

- Do you remember ZAPMAIL?
- Just in case you don't...

Predicting the advent of fax: What ZapMail was

- “With ZapMail, Federal Express couriers would pick up customer documents and take them to a Federal Express facsimile office for transmission. At the far end, another Federal Express courier would deliver the document to its destination within two hours. Federal Express placed machines on the premises of some of its larger customers.”
- “ZapMail transmissions were carried over a private Federal Express packet-switching network, but the company planned to migrate the network to satellite technology.”

Predicting the advent of fax: Brave new words of 1984 (1)

- "In the midst of investing more than \$1 billion in ZapMail, confident Federal Express Corp. executives enjoy talking about the early days of the company, only a decade ago, when times were so rough that one pilot en route to Federal's Memphis Superhub had to stop and pawn his watch to pay for jet fuel."

Predicting the advent of fax: Brave new words of 1984 (2)

- “The reason for all the chatter about the early days at Federal Express is the similarity between the company's initial bet—that people were willing to pay for highly reliable overnight delivery of packages and documents, and the company's recent launch of ZapMail, its two-hour document delivery service. In both cases, Federal made large initial investments to enter new industries where the long-term viability of the market, and the ultimate return on investment, were uncertain.”

Predicting the advent of fax: Brave new words of 1984 (3)

- “‘Launching ZapMail is analogous to the initial launch of Federal Express,’ said Thomas R. Oliver, vice president of marketing. ‘This is a brand new, uncharted frontier. If you ask people what it was like in 1973 when Federal Express began, the same environment existed. There was a period of losing money in a new field that Federal Express believed had a tremendous future.’”

Predicting the advent of fax: Brave new words of 1984 (4)

- “‘This is similar to our first experience,’ said James L. Barksdale, Federal’s chief operating officer, in a separate interview at the company’s Memphis headquarters. ‘There were airplanes and pilots and there were trucks doing pickup and delivery, but putting them together created the new product.’”

Predicting the advent of fax: The cold water of 1986 (1)

- "Allan McArtor, senior vice president of Fedex's Telecommunications Division, said that Zapmail was 'an idea ahead of its time,' pointed to last mile local transmission costs as one of factors that made it too expensive to catch on against 'inertia' that's inevitable in a new offering. Satellite system with thousands of inexpensive earth stations located at customer premises would have solved last mile problem. But now it's obvious that Fedex planners saw this as too little—or, in light of approximately \$200 million price tag of space segment, too much—too late."

Predicting the advent of fax: The cold water of 1986 (2)

- “Other problems with Zapmail that observers have mentioned include technical bugs in Zapmail system that resisted diagnosis and treatment and, perhaps most importantly, relative affordability and dissemination of fast Group 3 facsimile devices. Certainly, there’s hardly a communications company, PR or law firm of any size in Washington area without fax.”

Is the technology ready?

- In the laboratory?
- As a manufacturable prototype?
- For niche markets?
- For mainstream markets?
- For the onslaught of competitors?
- For prime time production scale?
- For political consciousness of its potential?



The technology is ready— But is fate on your side?

- We all remember Elisha Gray...
- Don't we?

We all remember

ELISHA GRAY

ALEXANDER GRAHAM BELL

- What do these two men have in common?

We all remember

ELISHA GRAY

ALEXANDER GRAHAM BELL

- Both invented a telephone...
- ...at about the same time (1876)

The technology is ready: But is the law on your side?

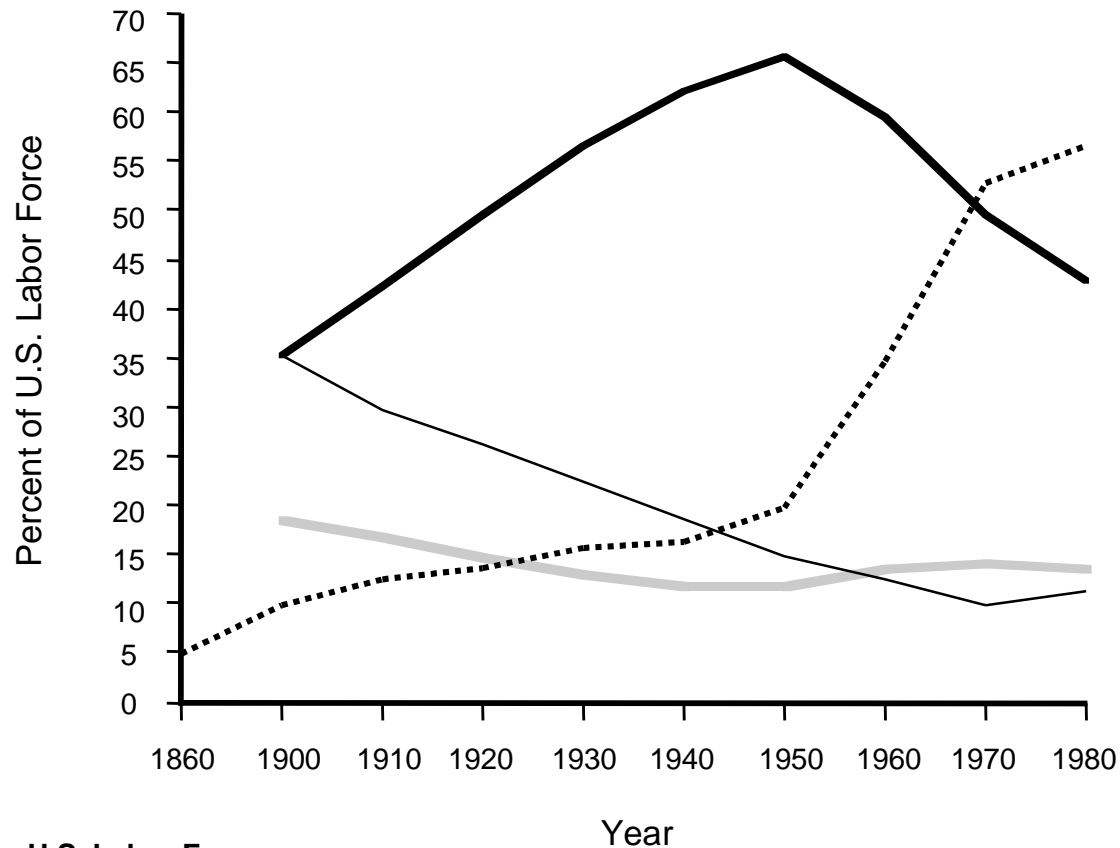
- "It cannot be helped, it is as it should be, that the law is behind the times."

Oliver Wendell Holmes

Oliver Wendell Holmes:

“It cannot be helped, it is as it should be, that the law is behind the times. I told a labor leader once that what they asked was favor, and if a decision was against them they called it wicked. The same might be said of their opponents. It means that the law is growing. *As law embodies beliefs that have triumphed in the battle of ideas and then have translated themselves into action, while there still is doubt, while opposite convictions still keep a battle front against each other, the time for law has not come;* the notion destined to prevail is not yet entitled to the field. It is a misfortune if a judge...forgets that what seem to him to be first principles are believed by half his fellow men to be wrong.”

Employment by industry sector

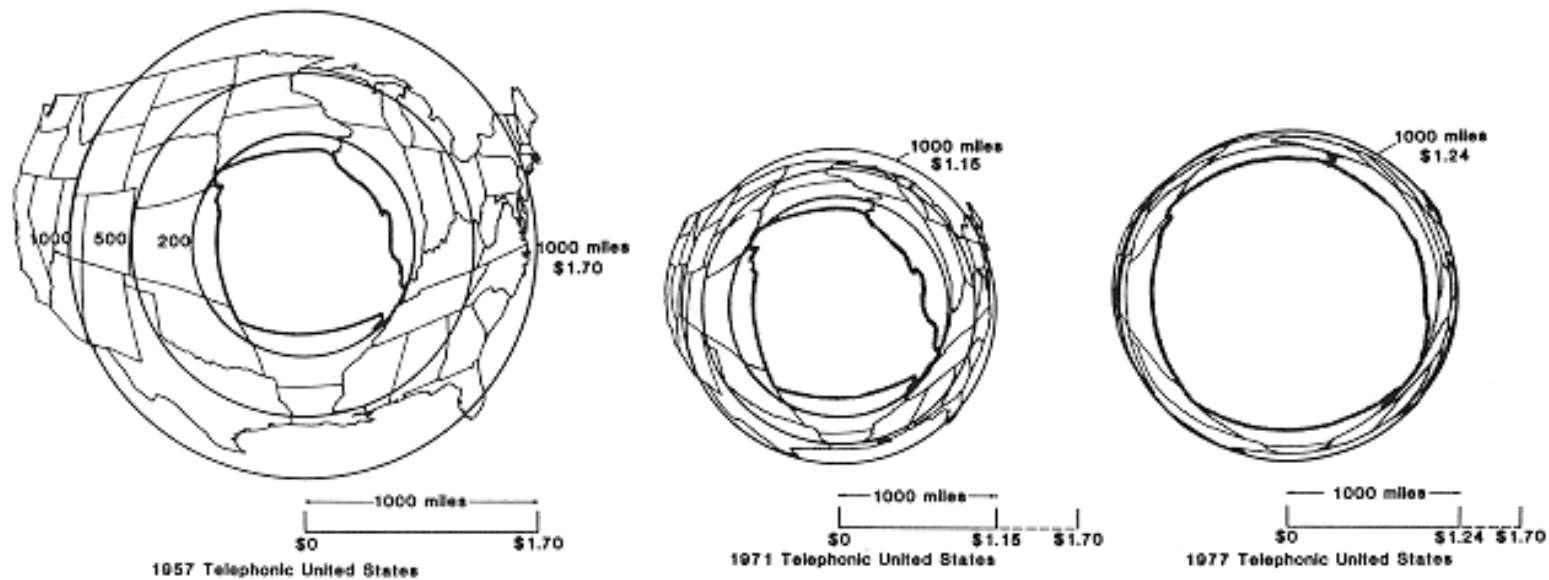


U.S. Labor Force

- Industry **——**
- Agriculture **——**
- Services:
 - Information Occupations **.....**
 - Other Service Occupations **——**

Source: Edwin B. Parker and Marc Porat, *Social Implications of Computer Telecommunications Systems*. Center for Interdisciplinary Research, Stanford University, February 1975. Reproduced by permission in John C. LeGates and John F. McLaughlin, *Forces, Trends, and Glitches in the World of Communications* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-89-2. 1989).

Telephone cost distances from Missouri, 1957-1977



Source: Anthony G. Oettinger, "Information Resources: Knowledge and Power in the 21st Century," *Science* **209** (July 4, 1980), 192. See also Mosco (P-95-4, 1995).

“Budget Is Cut for a Plan to Put Schools and Libraries on Line”

“The Federal Communications Commission decided yesterday to reduce by more than 40 percent the budget of a plan to connect schools and libraries directly to the Internet. ... All three of the Democrats on the commission voted in favor of the plan, while the two Republicans opposed it. ... Long-distance carriers are required to provide most of the money for the program.”

The New York Times
Saturday, June 13, 1998, A8

“Budget Is Cut for a Plan to Put Schools and Libraries on Line” (2)

“The AT&T Corporation and the M.C.I. Communications Corporation... have said in recent months that they intended to pass on to consumers the cost of contributions to the program.... That set off a blast of protest on Capitol Hill, directed at the FCC and in particular at the commission’s chairman, William E. Kennard.... The [\$2.25 billion] program enjoys the favor of Vice President Gore.”

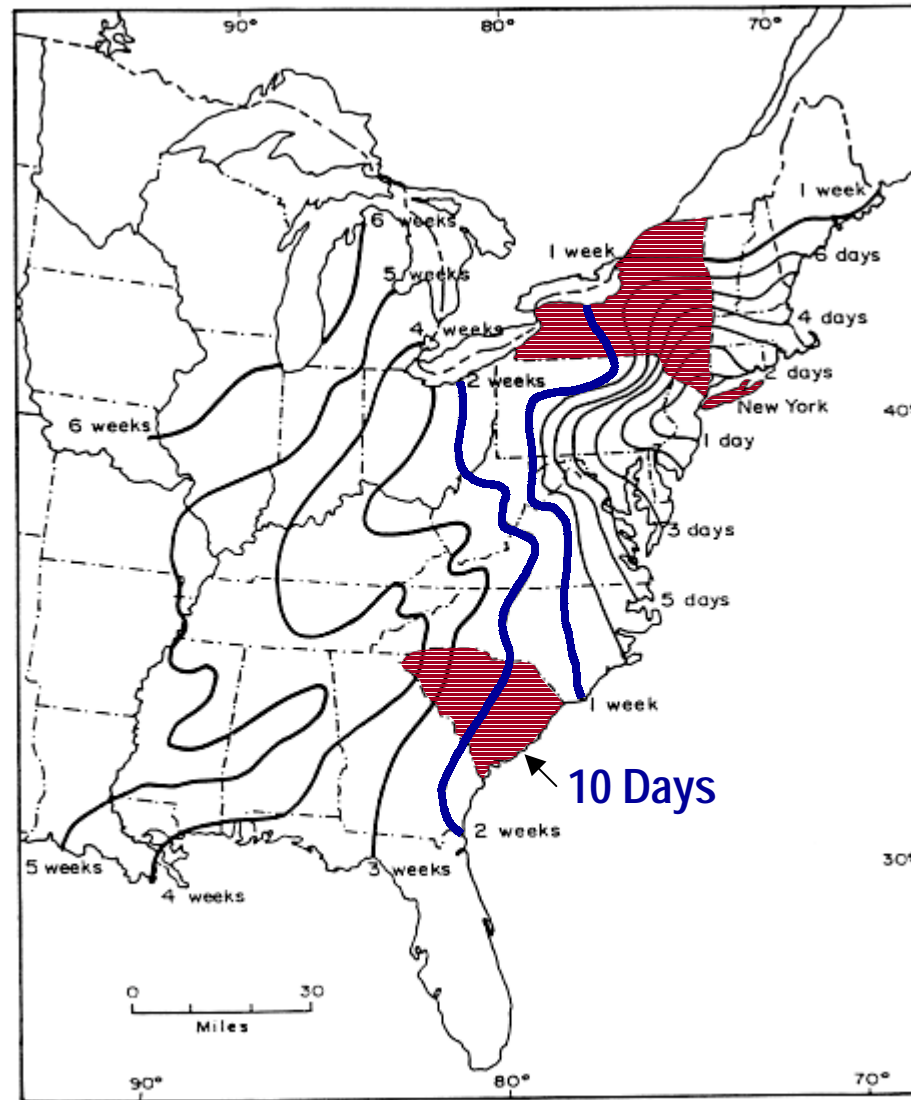


Vincent Mosco

***Will Computer Communication
End Geography?***

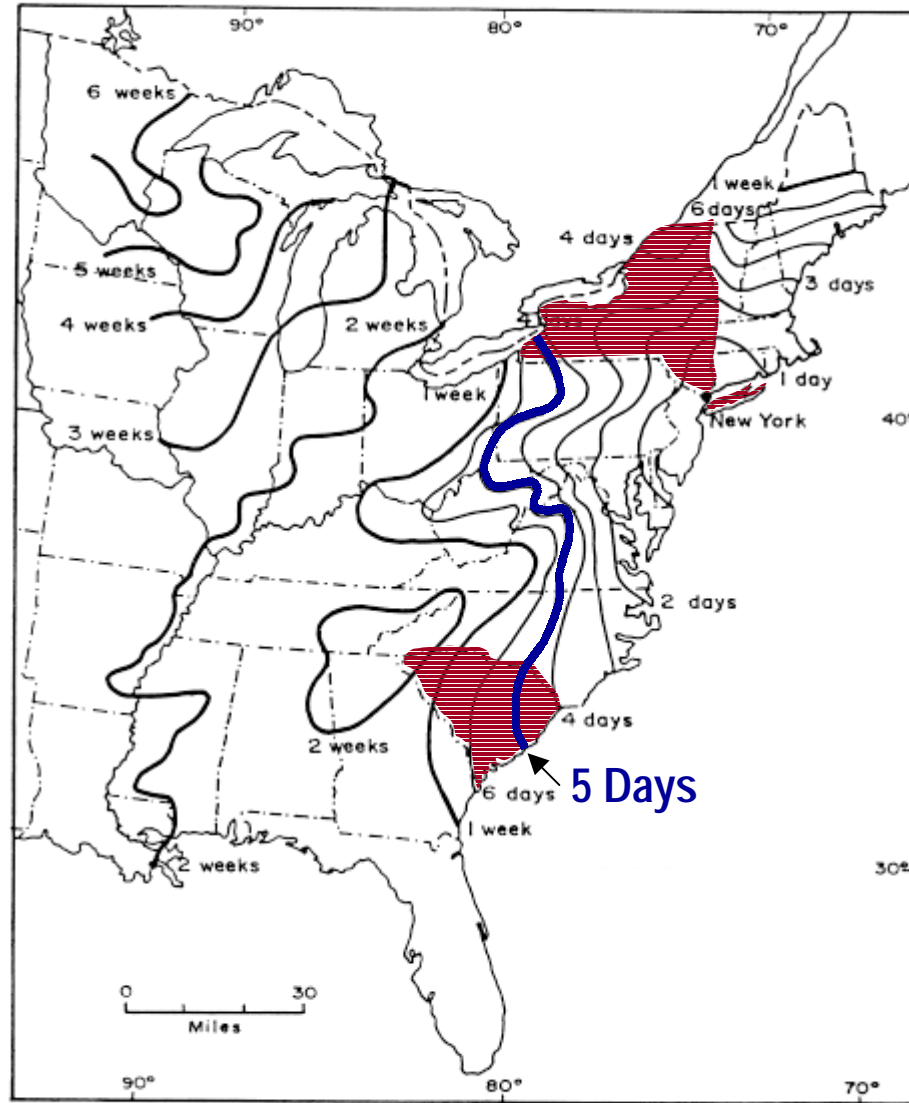
**Cambridge, Mass.: Harvard University,
Program on Information Resources Policy,
P-95-4, 1995.**

Rates of travel from New York, 1800



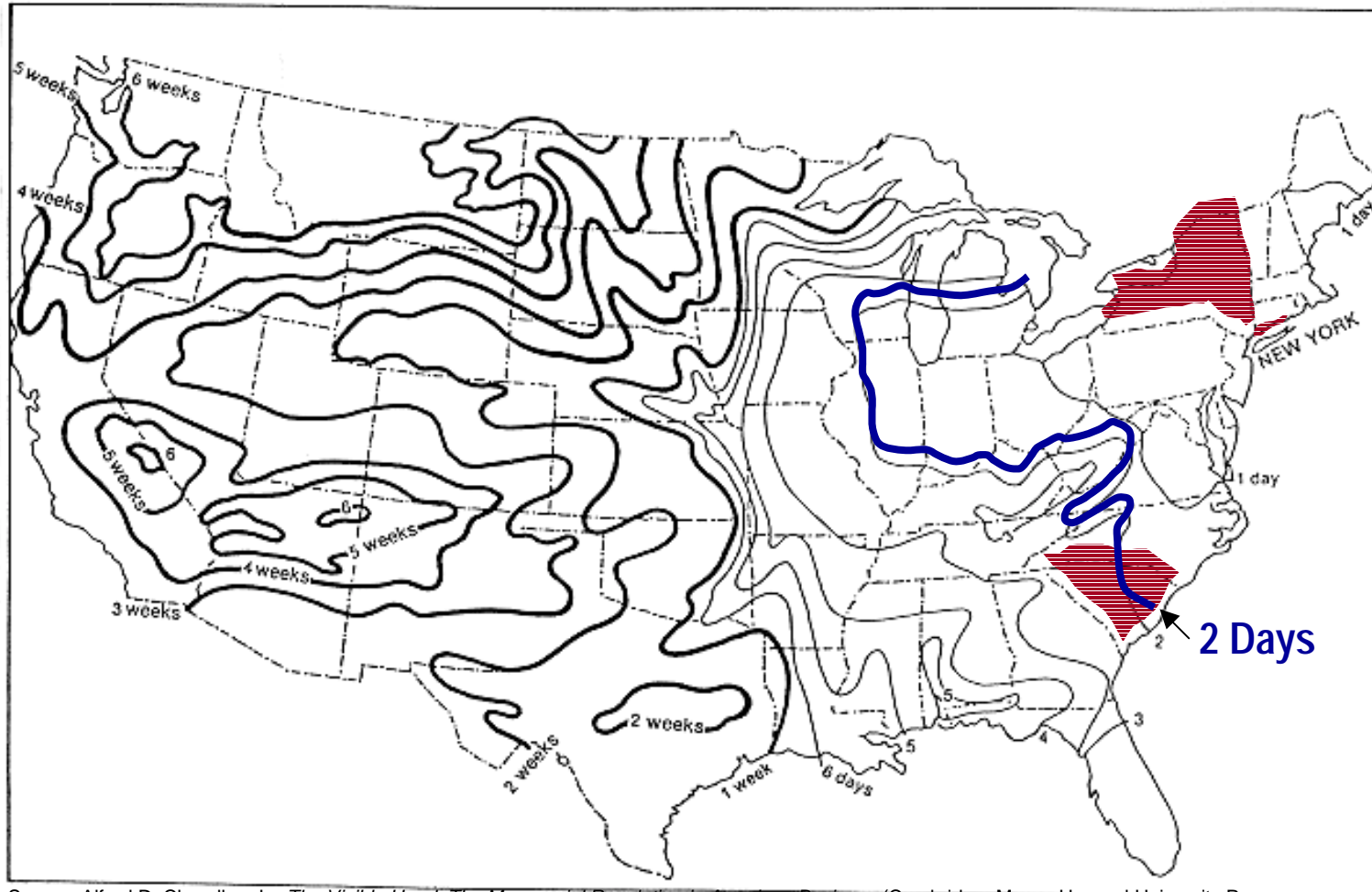
Source: Allan R. Pred, *Urban Growth and the Circulation of Information: The United States System of Cities, 1790–1840* (Cambridge, Mass.: Harvard Studies in Urban History, Harvard University Press, 1973), 176.

Rates of travel from New York, 1830



Source: Allan R. Pred, *Urban Growth and the Circulation of Information: The United States System of Cities, 1790–1840* (Cambridge, Mass.: Harvard Studies in Urban History, Harvard University Press, 1973), 177.

Rates of travel from New York, 1857



Source: Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass.: Harvard University Press, 1977), 85. See also Mosco (P-95-4,1995).

Mean public information time lag for New York, 1817 and 1841 (in days)

Public-Information Source	1817	1841	Percentage Decrease
Charleston	8.2	5.5	32.9%
Savannah	10.2	6.3	38.2%
Cincinnati	19.0	7.0*	63.2%
Detroit	18.0	7.5*	58.3%

*“Since eastbound and westbound mails were of equal frequency, and since both Cincinnati and Detroit possessed daily papers in 1841, New York-to-Cincinnati and New York-to-Detroit time lags were presumably not significantly different from delays in the opposite direction.”

Source: Allan R. Pred, *Urban Growth and the Circulation of Information: The United States System of Cities, 1790–1840* (Cambridge, Mass.: Harvard Studies in Urban History, Harvard University Press, 1973), 56; *New York Evening Post*, 1817, *New York Daily Tribune*, 1841. See also Mosco (P-95-4, 1995).

Richard R. John

***Spreading the News: The
American Postal System from
Franklin to Morse***

**Cambridge, Mass.: Harvard University Press,
1995.**

Charleston South Carolina: The Lynch Men of July 1835

- Abolitionist tracts sent via U.S. Mail
 - ◆ 175,000 separate pieces in summer of 1835 (about half of total sent by New York City periodical press in comparable period of time or entire output of periodical press of the South)
 - ◆ Abolitionists deliberately refrained from prepaying the postage so as not to deprive postmasters of their accustomed commission
- Lynch Men, a Charleston vigilante society, broke into the post office and destroyed several thousand abolitionist periodicals

Charleston South Carolina: The Lynch Men of July 1835

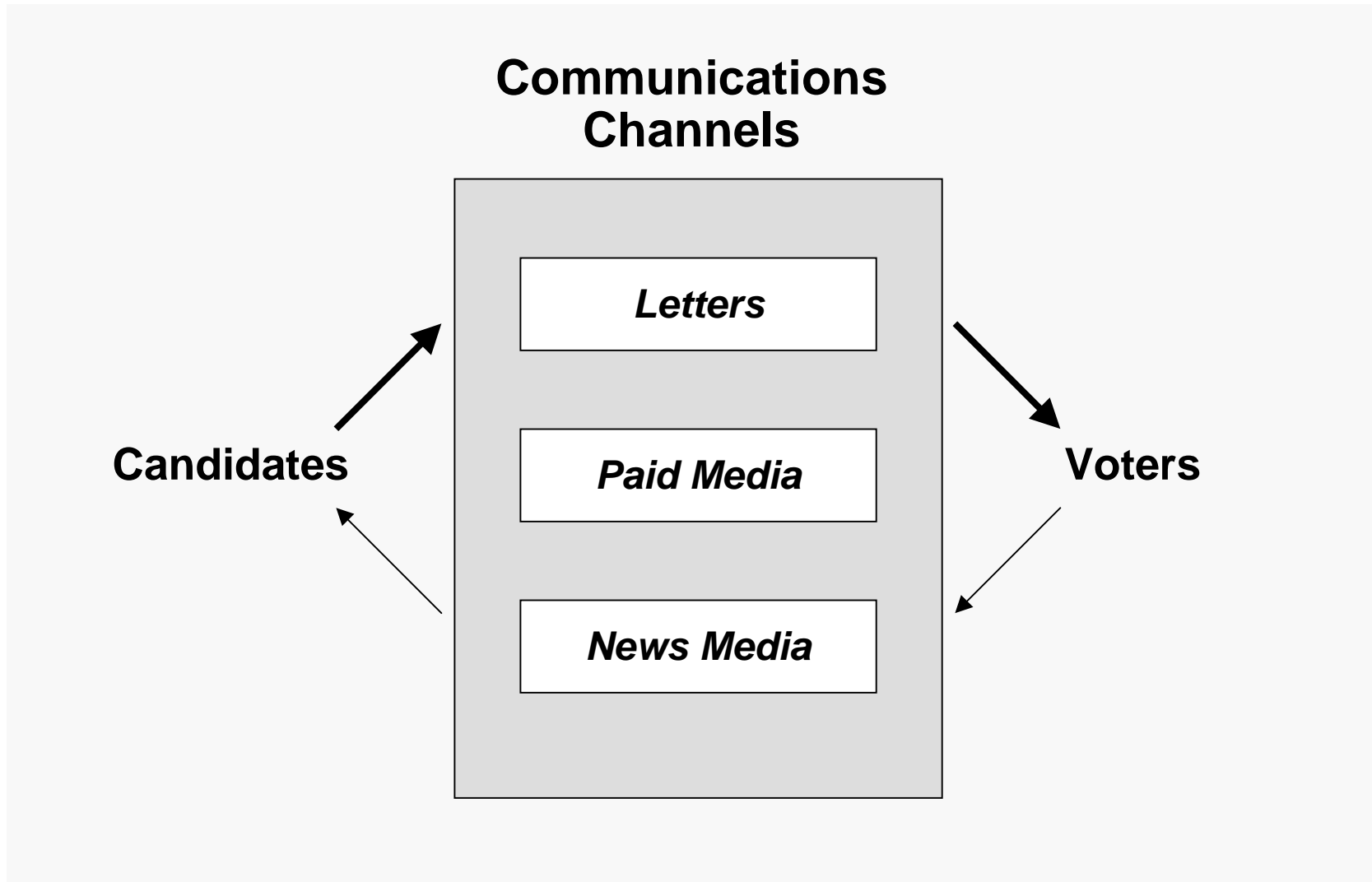
- “The controversy can be seen as the tragic epilogue to the communications revolution that Congress had set in motion with the passage of the Post Office Act of 1792.”
- “Between 1792 and 1835, the expansion of the facilities of communication had worked to strengthen the bonds of Union. Between 1835 and 1861, however, the same facilities worked no less inexorably to drive the Union apart.”

Thomas E. Baker

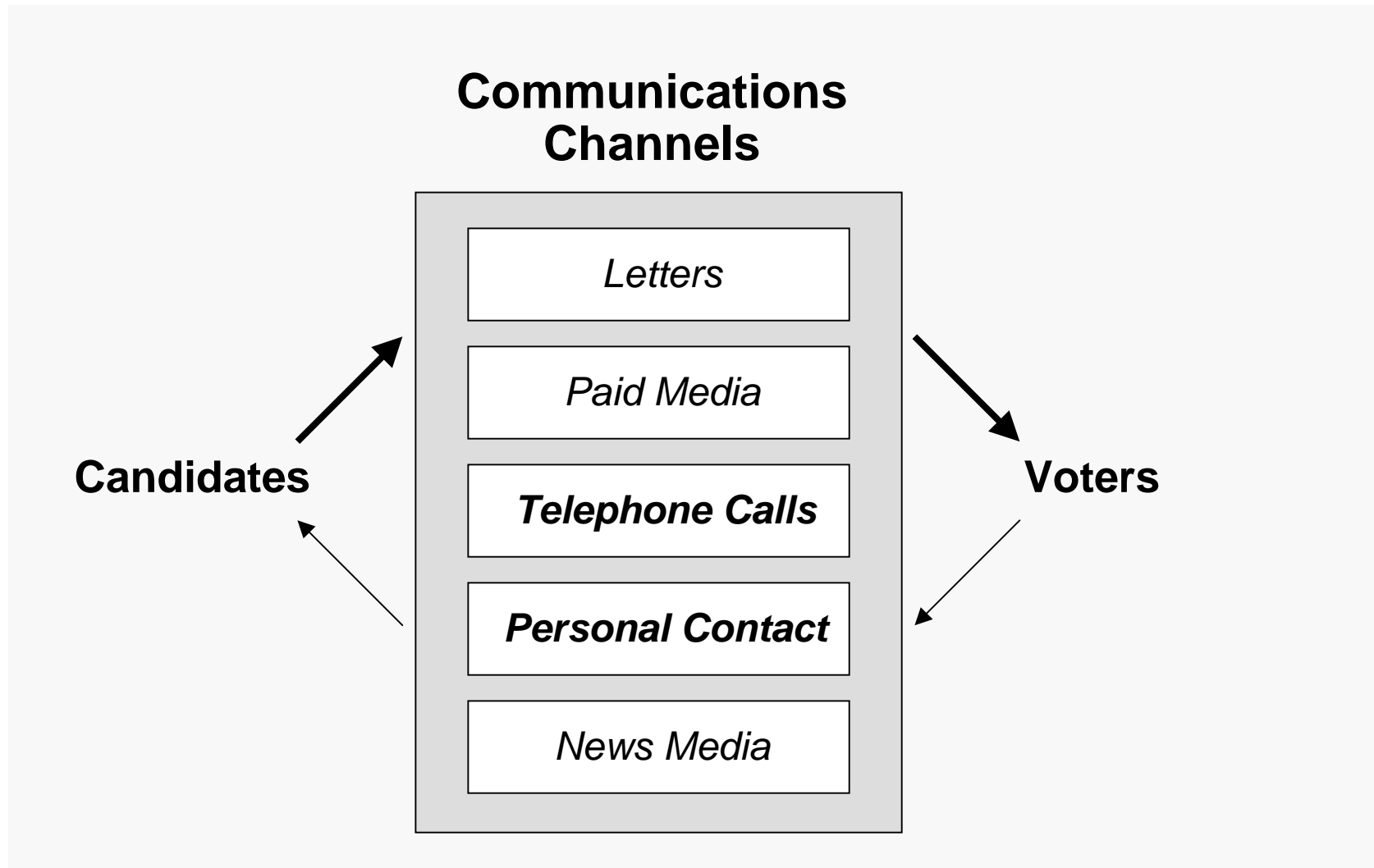
***Computers and Political
Campaigns: A Look At
Technology and Social Change***

**Cambridge, Mass.: Harvard University,
Program on Information Resources Policy,
P-83-4, 1983.**

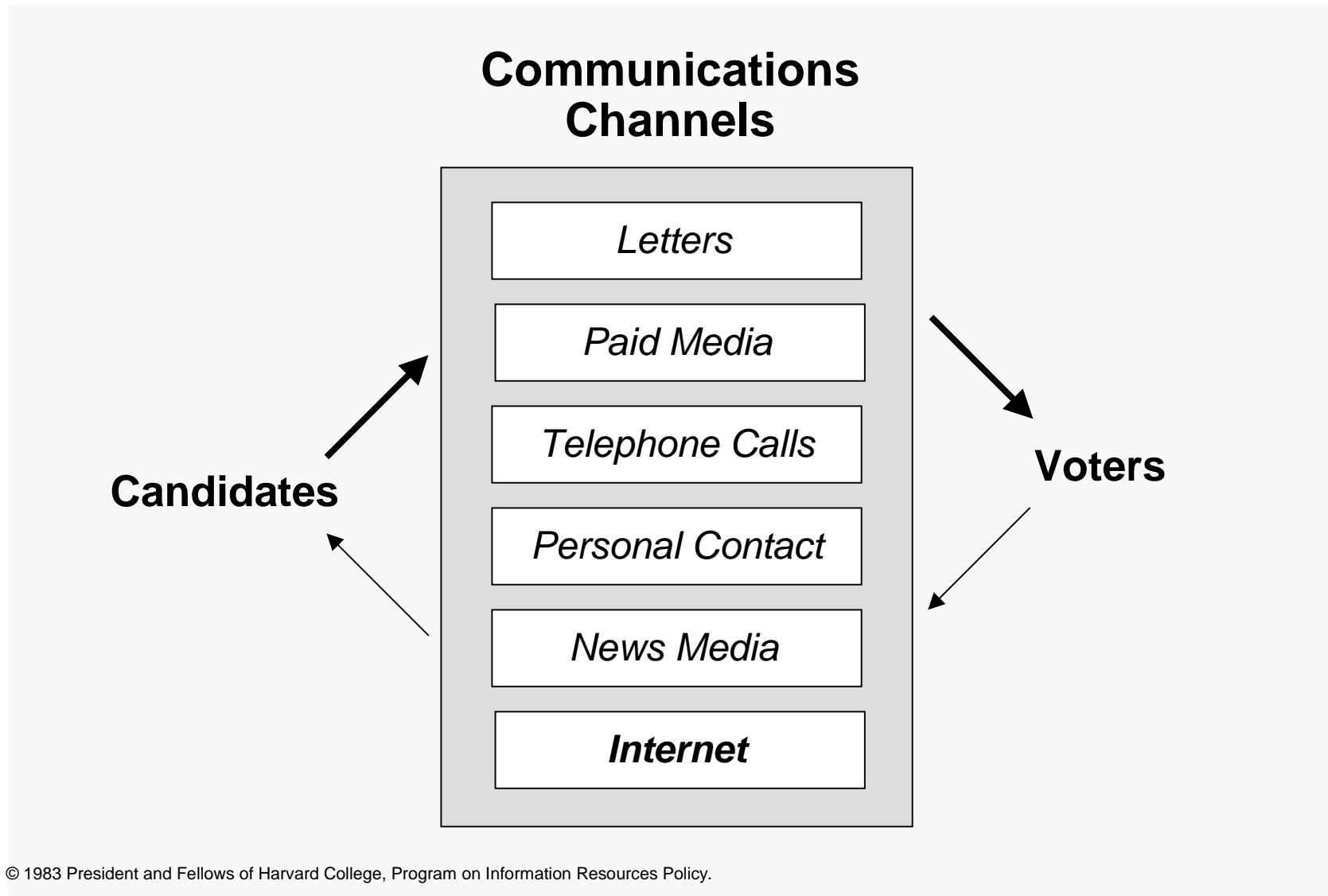
A simple conversation model: 1835



A simple conversation model: 1983



A simple conversation model: 1998



Stephen H. Lawrence

***Centralization and
Decentralization: The
Communications Connection***

**Cambridge, Mass.: Harvard University,
Program on Information Resources Policy,
I-83-2, 1983.**

Forces affecting the locus of decisionmaking

	Positive	Negative
Centralization	<ul style="list-style-type: none"> • Returns to scale • Optimization • Standardization/ uniformity • Criticality/importance • Coordination of interdependent activities 	<ul style="list-style-type: none"> • Information overload • Based on compulsion • Lack of flexibility
Decentralization	<ul style="list-style-type: none"> • Forces impartial standards • Initiative/innovation • Responsiveness • Simplify decision making • Minimize information resource requirements 	<ul style="list-style-type: none"> • Duplication of effort • Suboptimization • Less amenable to standardized change

Source: Stephen H. Lawrence, *Centralization and Decentralization: The Communications Connection* (Cambridge, Mass.: Harvard University, Program on Information Resources Policy, I-83-2, 1983). © 1983 President and Fellows of Harvard College, Program on Information Resources Policy.

Forces affecting the locus of decisionmaking: Balancing acts!

	Positive	Negative
Centralization	<ul style="list-style-type: none"> • Returns to scale • Optimization • Standardization/ uniformity • Criticality/importance • Coordination of interdependent activities 	<ul style="list-style-type: none"> • Information overload • Based on compulsion • Lack of flexibility
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Source: Stephen H. Lawrence, *Centralization and Decentralization: The Communications Connection* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, I-83-2, 1983). © 1983 President and Fellows of Harvard College, Program on Information Resources Policy.



Anthony G. Oettinger

**“Communications in the National
Decision-Making Process”**

Computers, Communications, and the Public Interest,
edited by Martin Greenberger. Baltimore: Johns
Hopkins University Press, 1971, 73-114.

Mixes of information flows: More balancing acts

Selection, Collation, and Interpretation of Data			
	Done personally by chief from the rawest data collected at all levels below	Intermediate options	Delegated to staff and advisors with data furnished by immediate subordinates only
Filtering	Minimum		Maximum
Information overload	Maximum		Minimum
Communications requirements	Maximum		Minimum

Mixes of authority flows



Forces affecting the locus of decisionmaking: Balancing acts!

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Centralization	<ul style="list-style-type: none"> • Returns to scale • Optimization • Standardization/ uniformity • Criticality/importance • Coordination of interdependent activities 	<ul style="list-style-type: none"> • Information overload • Based on compulsion • Lack of flexibility
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Source: Stephen H. Lawrence, *Centralization and Decentralization: The Communications Connection* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, I-83-2, 1983). © 1983 President and Fellows of Harvard College, Program on Information Resources Policy.

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (1)

Alain C. Enthoven

Vice President, Litton Industries (formerly Assistant Secretary of Defense for Systems Analysis)

Anthony G. Oettinger

Chairman, Computer Science and Engineering Board,
National Academy of Sciences

David Packard

Deputy Secretary of Defense

Ithiel de Sola Pool

Professor of Political Science, Massachusetts Institute of
Technology

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (2)

Oettinger: National decisionmaking, a complex and vital process in our civilization, critically depends on a vast and heterogeneous flow of data of which there is both too much and yet not enough that is relevant and timely. The spectacular growth of *communications* fortunately has given us powerful tools and techniques for the quick handling of masses of data. (Computers and communications have long since become inseparable. It is time to reflect this union in the fusion of their names.)

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (3)

Packard: Oettinger's paper is exceedingly interesting to me in view of my experience in Washington during the last year and a half. Had I read the paper a year and a half ago, I would not have appreciated much of it. But now I can see case after case and example after example of the kind of problem it addresses. The problem of filtering, for instance, is a real one. A prime example of a filter in an information system is a military briefing, and I have learned very quickly to take every military briefing with a grain of salt.

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (4)

Pool: Oettinger's paper is both sound and important.... Oettinger is not advocating motherhood. On the contrary, what he has said is highly controversial. Most members of the national policy and intelligence community would disagree with him. Many would wax apoplectic at his suggestion to provide general access to raw data and permit identification of the sources of material in evaluated intelligence analyses.

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (5)

Pool (cont.): The generally accepted objective of intelligence analysis is to produce an agreed-upon, anonymous intelligence estimate. If it is not anonymous, it is passed on under the fraudulent signature of the head of the organization....

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (6)

Pool (cont.): Professionals greet with alarm and consternation any suggestion that the State Department should be able to bypass the ambassador and probe the varied views of all its personnel abroad, or that a President should be able to find out who contributed some assertion to a national intelligence estimate. They worry that the Secretary or President may be misled by some unevaluated random fact.

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (7)

Packard: Again I find these observations interesting in terms of my own experiences. I have intelligence reports on my desk every morning from both the Central Intelligence Agency and the Defense Intelligence Agency. When I began to be concerned about certain things, I found that it was very helpful to go back and double check some of the raw data. This capability does exist, and it is being used.

Discussion: Sept. 1969–May 1970 at Brookings Institution in D.C. (8)

Enthoven: The main deficiencies in the flow of information to decisionmakers at the national policy level are caused by people and particularly by persistent organizational factors. Computer and communications technology is not going to solve these problems on its own. Oettinger is basically right in suggesting that improvements will require institutional changes.

David A. Radi

Intelligence Inside the White House: The Influences of Executive Style and Technology

Cambridge, Mass.: Harvard University, Program on Information Resources Policy, I-97-3, 1997.

The White House Situation Room

1991 (1)

- “Because its proximity to the president gives the Situation Room substantial power, its management presents a continuing organizational dilemma that reflects the intra-governmental struggle over formulation of national security policy. Nearly every aspect of the Situation Room’s function—mission, staffing, technology, and information sources—has been a point of contention in the national security community.”
- “In spite of the controversy, the Situation Room performs an essential and enduring service in the executive branch by synthesizing vast amounts of information and intelligence for senior decision makers, during both routine and crisis operations.”

The White House Situation Room 1991 (2)

- “The key to performing this mission is maintaining a balance between technology and the personalities and skills of the officeholders as well as among the types of information that flow into the watch.”
- “Having himself been a watchstander in the White House Situation Room (1988–91), the author suggests that because the Situation Room must be adaptable to the styles of each president and national security advisor, its role may necessarily be “reinvented” with each administration.”



David J. Seipp

***The Right to Privacy in
American History***

**Cambridge, Mass.: Harvard University, Program on
Information Resources Policy, P-78-3, 1978.**

The New Inquisition (1)

"I am a census inquisitor.

I travel about from door to door,

From house to house, from store to store,

With pencil and paper and power galore.

I do as I like and ask what I please.

Down before me you must get on your knees;

So open your books, hand over your keys,

And tell me about your chronic disease."

The New Inquisition (2)

"Are you sure you don't like it? Well, I'm not to blame; I do as I'm ordered. Wouldn't you do the same? I'm a creature of law, and work in its name To further the new statistical game."

"I nose around from garret to cellar,
With my last improved statistical smeller.
If the housewife objects I loftily tell her,
'I'm a socialistic government feller.' "

 *The New York Sun*, 1890

For more information:

<http://www.pirp.harvard.edu>



Inertia—Nimbleness

Stability—Innovation

Drag—Volatility