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ABSTRACT

This paper describes Alaska's state-managed telecommunications system, and details state efforts to increase the value of the state's information system to users within state government and in the private sector. The results of two studies conducted in 1986 at the request of the State Legislature are discussed, i.e., a statewide survey of Alaskan households and a Delphi study of legislators and telecommunications experts. The passage of a bill in 1987 to create a cabinet-level Telecommunications Information Council is noted, and efforts by the council to create information plans for state government are considered. Five information systems models are then examined in light of Alaska's experience, and it is concluded that such models should be adjusted to take into account the important role of technology managers in the communications process. Four figures and a number of footnotes are provided. (29 references) (Author/EW)

Managing Alaska's Information Systems:

A Participant-Observer Study

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Managing Alaska's Information Systems: A Participant-Observer Study

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Abstract

Responsibility for the operation of an unusually complex state-managed telecommunication system in Alaska has historically been separated from responsibility for its content. This has led to major problems in both broadcast telecommunication and computer-based information systems in recent years.

Alaska's House Special Committee on Telecommunications, beginning in 1985, attempted through hearings and, later, legislation to increase the value of the state's information systems to users within state government and in the private sector. These efforts led to passage in June 1987 of a law creating a cabinet-level Telecommunications Information Council. The Council is now attempting to create information plans for state government.

Alaska's experience suggests that models of information systems should be adjusted to take into account the important role of technology managers in the communication process.

Managing Alaska's Information Systems: A Participant-Observer Study

Introduction

Alaska's great size, small population and rugged terrain have forced it to develop an unusually complex telecommunication system. The state's Department of Administration is responsible for broadcast, two-way voice and video, and computer communication systems. Digital and analog information is moved through a state-managed system that includes microwave and satellite networks, computer centers in Alaska's three largest cities, and terminals scattered over 5,300 miles which in mid-1987 were processing about 850,000 transactions/ messages daily.[1]

Television and radio are used in Alaska for business communications that might be accomplished in person or by mail in other states. A judge in the North Slope village of Barrow, for example, testified to a legislative committee in the spring of 1987 that he used public radio to notify jurors when to report for jury duty. This type of use has become part of the state's justification for supporting communication systems that might be the responsibility of the private sector elsewhere. This convergence not just of transmission

[1]Department of Administration Division of Information Resource Management, Information Resource Management Users' Guide, Second Discussion Draft, June 18, 1987, p. 3.

technologies but of uses explains what might seem to be an unusually broad definition of information systems in this paper.[1] It is further evidence in support of Ithiel de Sola Pool's observation that "the one-to-one relationship that used to exist between a medium and its use is eroding" (1983; p. 23).

Circumstances have tightly linked computer information systems and broadcast telecommunication in Alaska. However, while the technical aspects of Alaska's telecommunication grid have held the attention of state government, its effects on Alaskan people have not. Responsibilities for the technologies and for content have been separated in Alaska, as has been the case elsewhere. Lorraine Amico found that most states in the early 1980s were managing information at the agency level and that they were mainly concerned with managing the technological resources. She said state and federal governments need a mechanism to identify users' information needs (Amico, 1987).

Willard Rowland (1982) found that, at the federal level, user concerns received little attention before the mid-1960s. The pressures for new federal telecommunications policies that emerged in the mid-1960s -- new technologies, calls for changes in the

[1] Distinctions among information systems are becoming increasingly hard to draw. A U.S. House of Representatives subcommittee was told in 1981: "It appears that the key factor in both the information and telecommunications industries during the next few decades will be the continued synthesis of information and telecommunications technologies." Jean-Paul Emard, Science Policy Research Division, Congressional Research Service, "Information and Telecommunications: An Overview of Issues, Technologies and Applications," report for the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, U.S. House of Representatives, July 1981, p. 102. Nicholas Garnham has also remarked on the policy implications of the convergence of computing and telecommunications (1985).

regulatory process, concerns about the effects of the broadcast media, and clashes between the executive and legislative branches -- all have their parallels in the climate that led to an attempt in the mid-1980s to establish telecommunication policies in Alaska. These pressures largely reflect increasing user activity in an area where their interests have not been well represented.

Anthony Smith has observed that computer and broadcasting systems are subject to similar types of controls. "Already in the broadcast media we have seen the development of controlling institutions based upon the transmission technology (and justified by a supposed shortage of spectrum capacity) rather than upon the content." In computer-controlled information systems, too, "the sovereignty over the text moves from the supplier of information to the controller of the technology" (Smith, 1980, p. 21). Implications for users of this bifurcation of responsibilities at the source level is the central concern of this study.

In Alaska, the state government has only occasionally tried to provide policy guidance to the development and operation of telecommunication systems. Thus, there was no one to speak for them when declining state revenue made them vulnerable to budget cutting in 1986 and 1987. The absence of advocates for telecommunication resulted in cutbacks and the threat of elimination of some telecommunication services.

What follows is a description and preliminary evaluation of a three-year effort to give those concerned with the content of communication a stronger voice in the management of Alaska's state-supported telecommunication systems. This may be seen as an attempt on

behalf of communication users --sources and destinations, in the language of the Shannon-Weaver model (Shannon and Weaver, 1949) -- to increase control over a communication system in which technology-driven concerns dominated.

Methodology

The chairman of Alaska's House Special Committee on Telecommunications approached the faculty of the Department of Journalism and Public Communications at the University of Alaska Anchorage in September 1985 to ask for help. A draft of an interim committee report had just been completed and he was planning to solicit comments to it on the university's statewide electronic mail system. He thought the report needed editing and he was looking for additional comments on the report itself. These requests led to continuing involvement between the department and the committee.

Beginning in September 1986, the department conducted several research projects and did other consulting work under three contracts with the committee. The author was involved in all three contracts, and continues to act as a special consultant to the committee.

This relationship has enabled the author to interview the principals, freely examine state documents, and observe the policy making process at close hand for a considerable period of time The author's involvement included the collection of information about telecommunication use from a statewide random telephone survey of households in November 1986. Two-hundred interviews were completed with adults in households selected from a list of randomly

generated telephone numbers. One hundred of the interviews were conducted in the Anchorage metropolitan area. The other 100 were conducted with households in rural areas. Small cities such as Fairbanks, Juneau and Sitka were excluded from the sampling frame so that differences in media use in urban and rural areas could more easily be observed. The response rate was 78 percent.

A three-stage Delphi survey of Alaskan legislators and telecommunication experts about the future of telecommunication in Alaska was conducted between October 1986 and January 1987. One-hundred-twenty people were invited to participate; 30 of them did. Those selected were paired on the basis of their interests and occupations, then half of them were asked to take part by electronic mail, using a special bulletin board that was established for them on the university's computer system. The other half used the U.S. mail. Only a handful of the 60 legislators included in the survey actually took part. And only four of those in the electronic mail group participated (and two of the four ultimately participated by regular mail).

Information gathered through the two surveys was presented to the Legislature together with a review of the development of the state's telecommunication systems in a report titled "Talking to Each Other, Talking to Machines: Alaska's Telecommunication Future" (Pearson and Barry, 1987).

Activities for the House committee also included the drafting and editing of documents used in efforts to establish new telecommunication policies. While the author was a full participant in this part of the process, he was an observer in the political part of the process. He was an advocate throughout for changes that would make

the state's telecommunication systems more responsive to communication sources and recipients.

Thus, while participation involved gathering information and taking positions on issues, it stopped short of setting strategies for reaching political goals. (While the author's primary concern was with content, the chairman of the committee often would suggest changes in wording or tone to make documents politically more acceptable.) Thus the author was an observer in one of the areas of concern in this paper: the politics of telecommunication policy making. He was a participant who had taken a position in the other major area of concern: the management of telecommunication systems. This involvement has undoubtedly colored the description of attempts to change the way telecommunication systems are managed. However, the author was not in a position to assure the success or failure of these attempts.

As is often the case with participant observer studies, it did not become evident until long after involvement with the committee began just what the ultimate focus of the study would be. It was nearly a year before establishment of a telecommunication policy making body emerged as a priority for the committee; when it did, that became the focus for this study. Other telecommunication policy issues which emerged or were resolved within this time frame make it possible to provide some perspective on this central issue.

Telecommunication Uses and Users in Alaska

Many parts of the state including its capital, Juneau, can be reached only be airplane or boat. Less than a fifth of the state's

communities have local weekly or daily newspapers. Printed materials including newspapers and the mail reach many of the state's residents only after long delays, if at all. Most telephone communication, even over short geographic distances, is via satellite. Telephone companies receive two subsidies, one from AT&T and one from the FCC's national High Cost Factor pool, (they totalled about $135 million in 1987) to offset the higher costs of providing service in the state. About 10 percent of the state's residents are unable to receive any broadcast communications other than those funded in whole or in part by the state.[1] Forty-one communities did not, in 1987, receive any radio signals at all. The state's computer network, connecting facilities in 39 communities, is 5,000 miles long. A second, university network also connects users separated by hundreds of miles.

Telephone surveys conducted in November 1986 found that use of computers was high (60 percent of rural respondents and 75 percent of Anchorage respondents had used them) as was use of VCRs (69 percent in Anchorage and 66 percent in rural Alaska as compared with a national average of about 40 percent at that time[2]). These findings are consistent with those of other studies, all showing high use of available media by Alaskans. The findings also indicated that rural Alaskans were more likely than urban Alaskans to prefer broadcast media over print for getting information about state

[1]Based on information in a memorandum from Herb Holeman, Alaska Public Broadcasting Commission engineer, to Charles Northrip, APBC executive director, Feb. 24, 1987.

[2]The figure for VCR ownership in the United States is taken from the Oct. 15, 1986, issue of *Variety*.

government (Table I). It is believed that this finding reflects differences in how the two groups are used to getting this information.

Table I

Preferred Medium for Information About State Government

	Rural Alaskans	Anchorage Residents
Television	31%	28%
Radio	22	16
Newspaper	26	43
Mail	11	7
VCR	1	1
Friends	1	5
N =	100	100

While most urban and rural Alaskans said they had used computers, only 19 percent of the Anchorage users and 17 percent of the rural users said they had communicated via computer. These responses corresponded to computer use reported in a mail survey of state commissioners and the governor conducted in August 1987. All state commissioners and the governor were asked how they communicated with their managers. While 10 of 16 respondents said they made use of electronic mail, only three said that they themselves used computers for electronic mail.[1]

[1]Means of communication with managers (all respondents): conversations, messages, 38%; telephone, 27%; memos, 20%; electronic mail, 9%; audioconferencing, 5%; videoconferencing, less than 1%.

The state government has pioneered in such areas as providing programming via satellite -- at one time the state funded two satellite TV channels -- and in the use of two-way telecommunication to help residents in remote areas solve medical and other types of problems. It has reached an agreement with NASA to test a satellite-supported cellular radio system.[1] Several meteor burst sites have been established across the state for bouncing transmissions off micrometeorites entering the earth's atmosphere.

State-supported public radio stations provide message services for those who have no telephones and are part of the statewide emergency warning network. A state-supported public TV station in western Alaska broadcasts in a native language, Yupik, to villages where many do not speak English.

The state's investment in one television system alone, the Rural Alaska Television Network (RATNET), has been estimated at more than $60 million. The state has spent about $10 million annually on broadcast telecommunications. The Rasmuson Library at the University of Alaska Fairbanks has been engaged for two years in a project to deliver textual information to distant points using the vertical blanking interval of the RATNET channel.

In the spring of 1987, when state funding for broadcast telecommunication was threatened, more than 120 Alaskans wrote to the House Special Committee on Telecommunications. With few exceptions these letters stressed the importance to the writers of

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[1]Division of Telecommunication Services and Division of Telecommunications Operations, Department of Administration, Telecommunications Fifth Annual Report, 1985, January 1986, p. 19.

broadcasts for information needed in their work, for entertainment, for messages to and from people who could not be contacted in other ways, and for keeping informed about events in other parts of the state, the nation and the world. Several who lived in isolated areas said it was important to their mental health. These letters help explain the high levels of media use by Alaskans.

Computer-based and broadcast telecommunication systems clearly have assumed unusual importance in Alaska because of the obstacles to alternative means of communication. And, inevitably, as many others have noted, the form of communication will affect "the goals, interaction, cohesion, productivity, etc." of those using it (Ugbah and DeWine, 1987). But the process is more subtle than that. It is useful to look at the impact of new forms of communication on their users; but it is useful, too, to look for the influences on the new communication forms. That is the stage at which the range of effects is determined.

The Telecommunication Managers

From 1971 to 1978 an Office of Telecommunications Policy existed within the Governor's Office. During this time experiments were begun in delivering health and education services to rural Alaska via satellite, and the Alaska Public Broadcasting Commission and the Rural Alaska Television Network were created. Much of the development of the state's telephone system, taken over from the military in 1971, occurred during this time.

In 1978 the Office of Telecommunications Policy was moved out of the Governor's Office to the Department of Administration and in

1979 it was disbanded. The Department of Transportation was given the responsibility of supporting the telecommunication system, but it was not given policy making powers. The following year the support responsibility was shifted to the Department of Administration, where it remains. A deputy commissioner was responsible for telecommunication until 1984, when the position was eliminated and the tasks devolved to division directors for telecommunications services, telecommunications operations, data network services and data resources management.[1] The telecommunications divisions were merged in March 1987.[2]

During the 1980s the Department of Administration has been charged with maintaining and expanding the telecommunication grid. Its Division of Telecommunications Services and Division of Telecommunications Operations have been responsible for broadcast telecommunication. While these divisions were responsible for the support of the Learn Alaska educational channel which began broadcasting in 1980, the Department of Education and the University of Alaska shared programming responsibilities. Similarly, while the divisions provided technical support for RATNET, the statewide entertainment channel,[3] content decisions were made by a 17-member board which looked to the Department of Administration only for its operating budget. The Alaska Public Broadcasting Commission,

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[1]Alex Hill, former deputy commissioner, Department of Administration, testimony at joint hearing of House Finance subcommittee and House Special Committee on Telecommunications, March 29, 1988.

[2]Steve Cowper, governor, Executive Order No. 66, Jan. 19, 1987.

[3]This channel was made possible through special agreements with the networks and the FCC. It rebroadcasts programs selected from Anchorage TV stations, from all three networks and from PBS via satellite to low power transmitters in 248 communities. It does not originate any programming.

Alaska in 1987

Growth processes	Stage I Initiation	Stage II Contagion	Stage III Control	Stage IV Integration	Stage V Data administration	Stage VI Maturity
Applications portfolio:	Functional cost reduction applications	Proliferation	Upgrade documentation and restructure existing applications	Retrofit existing applications using database technology	Organization integration of applications	Application integration 'mirroring' information flows
DP organization:	Specialization for technological learning	User-oriented programmers	Middle management	Establish computer utility and user account teams	Data administration	Data resource management
DP planning and control:	Lax	More lax	Formalized planning and control	Tailored planning and control systems	Shared data and common systems	Data resource strategic planning
User awareness:	"Hands off"	Superficially enthusiastic	Arbitrarily held accountable	Accountability learning	Effectively accountable	Acceptance of joint user and data processing accountability

Figure I: Information Processing in Alaska

based on "Exhibit I, Six Stages of data processing growth," in "Managing the Crises in Data Processing Management," Richard L. Nolan, Harvard Business Review, March-April 1979.

through which about $6 million in state money flows each year to the state's public broadcasting stations, has a similar relationship to the Department of Administration. It receives its money through the department but it operates in all other respects as an autonomous agency.

The awkwardness of this situation -- in which responsibility for programming and responsibility for signal delivery are held by different governmental units -- was underlined in early 1987 when the agency with delivery responsibility argued that the state should end its support of broadcast telecommunications services. The newly-elected governor accepted this argument and called in his January 1987 budget message for the elimination of funding for RATNET and public broadcasting.

This division of responsibility is paralleled in the state government's computer system. The Department of Administration's Division of Information Resource Management is charged with operation of the system. Its principal concerns have been cost-effective operation and system security. It has been less concerned with the products of the system. It has used a chargeback system and its review authority over the purchase requests of other agencies to assert its control over the system. The computer system appeared in early 1987 to be somewhere between Stages III and IV on Nolan's model of the "Six Stages of Data Processing Growth" (Nolan, 1979; see figure 1), though data administration was becoming a concern. And the problems of those stages which were anticipated in Nolan's study were beginning to concern state officials.

A state auditor advised the department in April 1986:

> The form of data processing has changed dramatically since 1972 . . . . Fifteen years ago, data processing referred to the centralized processing of information on a mainframe computer. Today, data processing has grown to include distributed processing systems and desk-top microcomputers with power that a mainframe computer had ten years ago . . . . The current statutes . . . do not accurately reflect data processing as it exists today. Management of a centralized function is vastly different from the management of a fragmented function. The actual condition of data processing in Alaska should be studied and a decision should be made as to where responsibility for managing the various data processing functions belongs. A plan should be prepared to present a structured approach to implementing a new allocation of responsibilities.[1]

The then-commissioner of administration acknowledged the points made in the audit report, but said, "It is difficult to overcome deeply ingrained attitudes and views that have had virtually no guidance or management for many years."[2] But there was more than inertia to overcome: " . . . there are thousands of employees discovering ways to do things better and recommending them to managers that are not technologically prepared to make decisions. Management is overwhelmed both by the intricacy and the volume of activity . . . "[3]

While the Department of Administration was charged with keeping the system running, content concerns remained the responsibility of individual departments. For example: "Problems with applications software should be solved by agency data processing personnel" rather

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[1]Division of Legislative Audit, A Report on the Department of Administration Information Resource and Communications Management Data Processing Management and General Controls at the Anchorage and Juneau Service Centers, April 22, 1986, p. 7.

[2]Eleanor Andrews letter to Gerald L. Wilkerson, CPA, Sept. 8, 1986, p. 2.

[3]Ibid.

than be referred to the department.[1] And: "IRM customers have the following responsibilities: 1. Customers design, develop, and maintain their own application systems . . . . 5. Customers are responsible for proofing, balancing, accuracy, and other similar quality-control functions of all computer processing results."[2]

The awkwardness of this arrangement became apparent earlier than was the case with broadcast telecommunication. In January 1984 an interagency group, the Information Systems Committee, was established to deal with emerging concerns. The Information Systems Committee is composed of middle-level managers from the various departments who meet regularly to discuss computer issues. Its goals were outlined at the first meeting by a Department of Administration official as being:

> to set policies and guidelines,
> to increase the productivity of state employees by the use of technology,
> to provide recommendations to the Governor's office,
> to encourage technological advancements, and
> to guide the Department of Administration in giving the departments assistance in computing resources.[3]

However, more than two years later, the committee had not moved beyond technical issues. As of May 28, 1986, information systems plans had been submitted by only three departments and the governor's office. The question was raised during the May 28 meeting of whether the committee should continue. "It was noted that interest

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[1] Division of Information Resource Management, Information Resource Management Users' Guide, p. 8.

[2] Ibid., p. 16.

[3] Summary of Jan. 5, 1984, Information Systems Committee meeting, p. 1.

seems to be falling."[1] The discussion led to a resolution in which the committee's goals were redefined:

1) ISC is an advisory committee,
2) IRM [the Information Resources Management Division of the Department of Administration] is the provider of data-processing services,
3) ISC is the place to discuss issues,
4) the members need to understand what their agencies need; ISC members will perform liaison function between IRM and the departments,
5) ISC has the opportunity to review short-range-plans . . . .[2]

A year later a Department of Administration deputy commissioner told the committee what he thought its goals should be. "Mr. Andrews stated that he wanted to balance the needs and viewpoints of the user with those of IRM, balance the service providing objectives of the Department of Administration with the control objectives of state government, and remain within the constraints of declining revenues."[3]

Meeting summaries indicate that the Information Systems Committee's agenda has been strongly influenced throughout its life by the Department of Administration and they provide little evidence that the committee has succeeded in looking beyond hardware and software issues to communication user concerns. Its annual report for 1986, for example, was just a page and a half long. The longest committee report was from the Chargeback Committee; the shortest report -- seven lines -- was from the Statewide Planning and Procedures Committee.[4] In April 1987, as a bill to create a

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[1]Summary of May 28, 1986, Information Systems Committee meeting, p. 2.
[2]Ibid.
[3]Summary of Information Systems Committee meeting, Jan. 14, 1987.
[4]Information Systems Committee 1986 Annual Report, December 1986.

telecommunications policy body was taking form in a House committee, the ISC discussed whether the ISC was the appropriate body to put together a statewide information plan. It instructed a subcommittee to continue working on such a plan as a substitute to the House bill.[1] The chairperson of the ISC said later, after the proposed policy body had become a reality, that her committee hadn't been as successful as members would have liked. "And I think if I had to look for the single reason why the ISC couldn't solve the problems, it is because we lacked the necessary clout to do so."[2]

Telecommunication as a policy issue

In the summer of 1984, when the Alaska Public Affairs Council decided to address telecommunications user issues, it directed its comments to the Legislature. It was concerned with the effectiveness of educational television and with state policy for entertainment television. It prepared a document that was largely an argument for interactive educational programming and more "Alaska-specific" programming. It noted the most common request from rural Alaska viewers was for more 'Alaska-specific' programming.[3] The Legislature did not yet, however, contain a body specifically concerned with telecommunications.

That body was created in 1985, during the next legislative session. The House Special Committee on Telecommunications was formed at

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[1]Information Systems Committee, Materials for April 8, 1987 Regular Meeting, Subcommittee on Planning Standards, Policies and Guidelines, p. 1.
[2]Beverly Reaume, chairperson, from transcript of Information Systems Committee meeting, Sept. 3, 1987, p. 9.
[3]Alaska Public Affairs Council, Inc., The Alaska State Telecommunication System, A Report to the Interim Committee of the State Legislature, July 1984.

the request of a state representative with concerns about the implications for Alaska of the AT&T antitrust decision and "the effect competition and decentralization of technologies could have on the State's telecommunication networks and its ability to manage its information resources including voice, data and video."[1] This committee upon its creation became the only government body in the state which regularly addressed telecommunication content-related issues. It has drafted legislation addressing a range of such issues including telephone rates, cable television regulation, and the funding of broadcast telecommunication. In 1986 this committee addressed the larger issue: management of telecommunication. On Sept. 18, 1986, it began circulating for comment the draft of a report titled "An Information Resource Management Plan for the State of Alaska." The report began:

> Alaska is a showcase of technology and is information rich. However, Alaska is on the poverty side when it comes to using and accounting for that technology, and making the information easily accessible to users. Policy makers have yet to realize the benefits that fully combining our technology with information management could have on the state's productivity and the delivering of services to the public.[2]

The report proposed creating a central person or agency to "plan, manage and assist agencies with information resource management." The agency would be located within the governor's Office of Management and Budget. The report drew responses from the

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[1]H.A. "Red" Boucher, chairman, House Special Committee on Telecommunications, letter to Governor Steve Cowper, Dec. 1, 1986. See also, memorandum to House Special Committee on Telecommunications members from H.A. "Red" Boucher, chair, regarding upcoming legislative agenda for the committee, Nov. 18, 1985.

[2]House Special Committee on Telecommunications, "An Information Resource Management Plan for the State of Alaska, Draft," Sept. 18, 1986.

departments of administration and education and from the Office of Management and Budget which indicated that several administrators agreed with its opening statement and supported the proposal for an information agency. The Alaska Library Association, in a lengthy response, called for recognition of libraries as the means of providing public access to government information.[1] The House committee commissioned the University of Alaska Anchorage Department of Journalism and Public Communications to gather additional information. The responses and some of the research findings were incorporated in a final report issued in January 1987.

While the draft report makes no reference to broadcast television, it was stimulated in part by what had just happened to the state's instructional broadcasting channel. Management of computer-based information systems and broadcast telecommunication systems were linked in a Department of Education official's response to the draft report:

> . . . the present hardware systems are of little use if there is not a commitment to and sufficient resources to accomplish the human side of the equation. I include here everything from utilizing information in the planning and management of affairs of the state to the research and data collection activities necessary to make them useful . . . . If this commitment is not forthcoming soon the state's information resource capacity will suffer the same fate as our telecommunications systems did in the continuing budget cutting process.[2]

The official spoke with some bitterness because he had just witnessed the shutting down of the instructional channel. The Learn Alaska

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[1]Alaska Library Association, "Alaska's Libraries: Links in a Statewide Information System," 1987.

[2]William J. Bramble, Department of Education, response to "An Information Resource Management Plan for Alaska," Nov. 7, 1986

channel was eliminated with little advance warning in the spring of 1986. The instructional channel had begun broadcasting in 1980. Its mission was to provide programming, including two-way programming, to rural schools. About a third of these schools consisted of one or two teachers who tried to meet the needs of students of every age. During its six-year life it was a second channel for many Alaskans who also received the RATNET channel. Learn Alaska appeared to legislators to be much less popular than the RATNET channel, which was carrying commercial programming. The chairman of the House Finance Committee, one of the legislators who perceived lower use of the channel as indicating it was unsuccessful, eliminated the Learn Alaska budget. The action drew little public attention. Alaskan newspapers reported it belatedly, if at all. The event went largely unnoticed in Anchorage, where nearly half the state's population is located, because the channel had not been broadcast there.

Information then available did not make it easy to evaluate the decision. The Department of Education had sponsored a survey of schools to determine their use of Learn Alaska. This survey indicated that it was providing a service, but these findings were not persuasive to legislators. The agency sponsoring the survey was also the agency providing the services; the results were what the legislators expected from such a survey. Methodology was never an issue.

Several months after the elimination of Learn Alaska the House Special Committee on Telecommunications staff attempted a census of rural school principals which asked about their schools' use of Learn Alaska. About 65 percent (181) of the principals responded, with a

third of the responses coming from principals of small schools. The responses indicated that larger schools felt the loss much less than did smaller ones, and that smaller schools felt the loss was a more serious one. Sixty percent of the small-school principals thought the educational channel should be reinstated, compared with 42 percent for medium-sized schools and 39 percent for large schools. The findings supported those of the earlier study. However, the feedback from users came too late to affect the decision of whether to preserve the system.

The committee's findings were included in the final report issued at the beginning of the 1987 legislative session.[1] The executive summary of that report stated:

> From the Committee's research in the area of information and communications, indications are that use, planning, allocation and evaluation of information resources are not receiving proper oversight and attention. Furthermore, due to technological changes in the industry, the current Department of Administration statutes providing for the management of information/communications resources are obsolete.[2]

The report called for the establishment of an Alaska Telecommunications Information Agency within the Office of the Governor. Issuance of the report was accompanied by introduction of a bill (H.B. 40) establishing the agency on Jan. 19, 1987, at the beginning of the legislative session.

The agency called for by this bill would have had decision power for all state purchases of information technology equipment and

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[1]Larry Pearson, Doug Barry, and Chris Herberger, "Managing Alaska's Information Resources: A Proposed Statewide Policy," report to the Interim Joint Committee on Telecommunications and the House Special Committee on Telecommunications, Jan. 19, 1987.

[2]Ibid., p. 1.

contracting services exceeding $25,000; to establish evaluation criteria for state-funded programs using information technology; to conduct an inventory of state-held information; to develop interactive communications; and to assist and educate state agencies in the use of information technology and systems analysis.[1]

It appeared for a time that the bill would die in the committee which had written it. A new administration had just taken office; the Department of Administration asked the committee to give it time to address telecommunication policy issues itself. The chairman of the telecommunications committee, a member of the same political party as the governor, was willing to do that.

Then the governor, in his State of the Budget message, made telecommunication policy a major issue again. He called for elimination of all state funding for broadcast telecommunication. That would mean elimination of the remaining statewide television channel. It would also mean that 15 public radio stations and four public television stations would lose their state money. It was not clear at first what the effects of this on public broadcasting -- or on Alaskans in rural areas -- would be. The information was not readily available within state government. But the communication sources and receivers -- broadcasters and their audiences -- quickly began to provide it.

The House telecommunications committee began hearings on the governor's proposal in February 1987. The hearings as well as mail

[1]The bill is described in "Managing Alaska's Information Resources: A Proposed Statewide Policy," a report to the Interim Joint Committee on Telecommunications and the House Special Committee on Telecommunications, by Larry Pearson, Doug Barry and Chris Herberger, Jan. 19, 1987.

received by the governor and the House committee indicated considerable public support for state-supported broadcasting. Investigation by the author of the origins of the proposal to end state funding revealed that little thought had been given to the consequences of such an action for Alaskans. Elimination of state-supported broadcasting had simply been seen as a way of saving money.[1] Elimination of RATNET, in fact, had first been proposed as a way of saving money by the Division of Telecommunications within the Department of Administration. (The fixed costs for operating RATNET represented 40 percent of that division's budget. By eliminating RATNET if the division's budget was reduced, the division could have avoided cuts in personnel or in activities in which it was more directly involved.[2])

The governor's proposal exacerbated committee concerns about the absence of any body within state government which could speak for telecommunication system users. On March 31, the committee completed a revised draft of the bill. As the bill developed, the policy body became a cabinet-level council rather than an agency. The principal reason for this change was to reduce its cost to the state. It was judged that state revenue reductions because of declining oil prices were too great to justify the funding of a new state agency. The council alternative would require no funding.

This change seemingly moved the proposed body further away from technical concerns. The agency would have taken on the

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[1]Telephone interview with Brian Rogers, chairman of Gov. Steve Cowper's transition team, Feb. 23, 1987.

[2]Interview with Mel Hoversten, director, Department of Administration Division of Telecommunications, March 13, 1987.

functions of the Division of Telecommunications in the Department of Administration as well as have assumed some of the responsibilities of the data network and data processing divisions. The Council was to be concerned only with higher level policy issues. One administrator, who later became vice chairman of the Telecommunications Information Council, suggested during a committee hearing that the bill "indicate that the council should remain at a high policy level" and avoid technical arguments.[1]

The revisions changed the nature of the policy body's authority. An independent agency would have drawn its power from its location close to the governor and from its review authority over the telecommunication activities of the various departments. The power of the council was based on the prominence of its members. Without a budget, the council could not monitor the telecommunication activities of the various departments. However, if the members of the council were the department commissioners, such monitoring would not be necessary. To further secure the position of the council, the legislation named the governor as its chairman.

While broadcast policy issues provided the impetus to revive the bill in committee, the bill's central concerns remained the management of computer-based information. The governor shared the committee's concern with this subject. In late 1986, Alaskan newspapers had reported that two state agencies were unable to account for large sums of money. The governor wanted departments to improve their management of fiscal information. He said in a March

[1]Bob Poe, deputy commissioner of transportation, minutes of House Special Committee on Telecommunications hearing on HB40, April 9, 1987.

26, 1987, memo that he would form an inter-agency working group to address the issue during the summer.[1]

A substitute (C.S.H.B. 40) for the original bill was brought out of committee on April 10, 1987, accompanied by a letter of intent which stated the problem as the committee perceived it:

> The information systems we have today have developed with minimal overall direction. They need to be evaluated. Is the information within them the information needed to enable government to do its job well? Does this information get to those who need it -- and in time? This bill would create a mechanism for this kind of evaluation. It would also create a body able to address the broader policy implications of the movement of information within the state government. It creates a body able to address such issues as how to move information across agency lines, and ow to move it between state agencies and the private sector.[2]

The substitute bill was referred to the House Finance Committee and then to a subcommittee. It returned to the floor on May 4, 1987. With the apparent support of the governor and several commissioners, including the commissioner of administration, the bill passed the House on a 38-0 vote the next day. It passed the Senate after reviews by two committees, and was signed by the governor on June 12, 1987.

Once again, the state had a high-level telecommunications policy body. The questions now became: Would it accept its responsibilities? Could it give users more control over information systems?

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[1]Steve Cowper, governor, memorandum to all cabinet members, March 26, 1987.

[2]H.A. "Red" Boucher, chairman, House Special Committee on Telecommunications, Letter of Intent for CSHB 40 (Telecommunications), April 1987.

The Telecommunications Information Council

The legislative summary of the bill creating the Telecommunications Information Council said the bill accomplishes three things:

*Establishes an "information" policy and planning group within the Office of the Governor.
*Begins comprehensive and coordinated "information resource management" planning for the state.
*Merges telecommunications and data processing in the policy and planning process.

The language came from a May 1, 1987, memo by the chairman of a House Finance subcommittee which reviewed the bill to other members of the Finance Committee. That memo indicated its author was chiefly concerned with technology-related problems. He identified "computer chargebacks, allocation of scarce data processing and telecommunications resources, system redundancy, incompatibilities and cost inefficiencies."[1] The memo leaves open the question of just what the term "information resources" means, as does the act itself. The chairman of the Finance Committee stated that this vagueness was deliberate:

> "Information systems" is purposely not defined in the bill so that the council may effectively respond to (1) rapid advances in information technology, and (2) issues which agencies, the university or the court system may wish the council to address.[2]

The Council met four times between September 1987 and March 1988. It has yet to take action on a telecommunication policy issue, though two issues which emerged during this time became the subject

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[1]Representative Pat Pourchot, memorandum to House Finance Committee members, May 1, 1987.

[2]Albert P. Adams, chairman, Hou e Finance Committee, Letter of Intent for CSHB 40 (Fin), May 1, 1987. Tnis letter was substantially different from the telecommunications committee's letter of intent, which it replaced. The Senate rejected this letter of intent.

of legislative hearings. This lack of action appears to reflect the problems of organizing a new body, working with limited resources (because the Council lacks a budget, it has no full-time staff members), and the emphasis of the law on "plans" rather than "issues."

The law creating the Council requires it to:

(1) establish guidelines and prepare a state short-range and long-range information systems plan to meet state needs;
(2) in accordance with the state information systems plan, establish guidelines and direct state agencies to prepare agency information systems plans;
(3) in accordance with statutes governing the availability and confidentiality of information, establish guidelines for the accessing of information by the public;
(4) publish in the first quarter of each calendar year a report on the activities of the council.

The Council can also, at its discretion, "Establish information-related policies and engage in information-related activities it considers necessary or appropriate."

The governor presided at the Council's first meeting, which was attended by 16 of the 18 department heads. Several of those present had traveled hundreds of miles to Juneau from Anchorage and Fairbanks for the meeting. The governor said government is information:

> It's the movement of information up to people who supposedly make decisions and then back down to the ones that implement the decision itself. So there is a lot of information in departments that isn't available to other departments, and a lot of information in general that isn't available to the public in any comprehensible format. The purpose of this committee is to try to sort that out and make information work for us instead of against us.[1]

[1] Steve Cowper, governor, from the transcript of the Telecommunication Information Council meeting, Sept. 3, 1987, p. 1.

The chairman of the House Special Committee on Telecommunications attended by teleconference. Speakers included the governor and the commissioner of administration. A deputy chairman was named. The meeting lasted about an hour.

When the Council met for the second time neither the governor nor the commissioners were present. The president of the University of Alaska, who attended by teleconference from Fairbanks, was the only cabinet-level administrator present. The law provides that deputy commissioners can represent their departments, but the level of representation in many departments had gone lower than that. Those present included members of the Information Systems Committee and the managers of agency data processing departments. The deputy chairman, who had secured a legal opinion on the issue of representation, told those present that departments could not be represented by officials lower in rank than deputy commissioner without a written delegation of authority. Two commissioners and four deputy commissioners attended the third meeting; six other departments were represented by lower-rank administrators. One of the commissioners said her continued attendance would depend on the direction the Council took:

> What it's going to come down to . . . is whether we get to the nitty-gritty of a policy that talks about real-life things that people like me who know nothing about any of this can understand, or whether we work at such a technical level and esoteric level that pretty soon there's no point in my coming. I might as well send somebody who understands something about all these systems.[1]

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[1]Myra Munson, commissioner, Department of Health and Social Services, from transcript of the Telecommunication Information Council meeting, Dec. 16, 1987, p. 5.

And:

> . . . you need the least computer-literate people to talk about, "how will this have to work for it to make any difference in my life ?" . . . For it to be meaningful, I think we have to be willing to spend some time on the conceptual part of the plan and identify what the specific detail information things we need are and then address those back to technicians and have them come back and make this into a meaningful process, even though that will take longer than what we could do fairly quickly.[1]

The two commissioners promised to impress on other cabinet members the importance of attending. Several commissioners were present at the next meeting in February when the Council adopted initial goals.

Members of data processing departments and of the Information Systems Committee remain close to the Council, however. Four of the five members of the subcommittee that prepared a draft set of goals and objectives in the fall of 1987 were members of the Information Systems Committee. They included the chair of the committee. Four of them -- the director and an administrator in the Division of Data Resources Management in the Department of Administration, the director of information systems in the Department of Transportation, and the director of administrative services in the Department of Public Safety -- had jobs that kept them close to technology issues.[2]

While the nature of department representation on the committee raises some questions about how successful the Council can be in changing the nature of state telecommunications management, the minutes show some effort by the Council to avoid being ensnared in technology-related issues. The chair and a member interrupted the

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[1] Ibid., p. 20.

[2] From transcript of the Telecommunication Information Council meeting, Dec. 16, 1987, p. 2.

state librarian when she referred to "some X-dot 25 conversions" at the December 1987 meeting. And members of the Information Systems Committee have expressed hope that the Council can address issues more effectively than the committee could. The Department of Administration's data resource management director, who helped organize the Information Systems Committee in 1983, said in an interview that he senses new optimism about what can be done with information in state government because of the Telecommunications Information Council.[1]

The Council issued a two-page annual report accompanied by a two-page work plan in March 1988. That report said that the Council had adopted three objectives as well as strategies for meeting them. The objectives:

> First, the council must develop a statewide telecommunication/ information management plan. Second, the council shall establish those institutional arrangements for developing and implementing improved information management in Alaska. Third, the council will establish the information management policies and guidelines to implement the plan.

The goals are restatements of duties set by law. The tasks give a somewhat clearer indication of the Council's priorities. Six tasks fall under the statewide plan objective. These require Council members to identify their information management resources, relate the missions of their agencies to information management, identify telecommunication/information management shortcomings, outline alternative solutions, decide on a solution, and monitor it as it is implemented. The deputy chairman of the Council has repeatedly

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[1]Interview with John Valensi, director, Division of Data Resources Management, Department of Administration, Dec. 2, 1987.

asked members to identify the critical success factors in their agencies so that these can be related to information needs, an approach to information management that was developed at MIT (Rockart, 1979).

A total of five tasks are listed for the other two objectives. One of these addresses the issue of control of the telecommunication systems. The Council will define the roles in statewide information management of the Information Systems Committee and of IRMEAC, an information resources management committee within the Department of Administration. The Council's handling of that topic will provide a clearer indication than anything it has done to date of the future relationships between technology managers and content managers in the state's telecommunication systems.

The record of meeting topics, like the evidence provided by attendance records, is ambiguous. The annual report said several issues had been raised at Council meetings. The ones mentioned are technology-related and reflect the concerns of technology managers rather than content providers: the capacity limits of the state's mainframe computers and the spread of mini-computers in agencies.

The Council has so far ignored two immediate telecommunication issues. An inter-agency work group reported to the Legislature in January 1988 on a six-month investigation of alternatives to the current state-supported broadcast systems. The team provided several options, some of which would affect programming content or even whether broadcast service remains available to some communities. The House Special Committee on Telecommunications

held a hearing on the report in February; the Telecommunications Information Council had not discussed it as of the end of March.

Legislators learned in March 1988 that the Department of Administration had been building a bypass telephone system for state agencies. The Information Systems Committee had learned of the system in July 1987 in a letter from the commissioner of administration, but the Telecommunications Information Council was not informed. Legislators learned of it when the state's telephone companies began to protest. The policy issue is whether the loss of the state as a customer will lead to significant rate increases for private phone users, and it was being argued in late March in House hearings. The commissioner of administration acknowledged in the first hearing that the issue should have been presented to the Telecommunications Information Council and that the larger policy implications of the bypass service had not been addressed.[1] In early April 1988 a House finance subcommittee was drafting intent language which would require several agencies to collaborate on preparing a report on this issue which they were to present to the Telecommunications Information Council by January 1989. The Council would in turn report to the Legislature before April 1989.

While these incidents are evidence that the Council has not yet been aggressive in identifying issues important to telecommunications users, they also show that the Legislature remains in a position to educate the Council as to its responsibilities.

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[1]John Andrews, commissioner, Department of Administration, testimony at joint hearing of House Finance subcommittee and House Special Committee on Telecommunications, March 29, 1988.

Discussion and Conclusion

Because communication models are simplifications of reality, the risks of applying old models to new circumstances are considerable

The Shannon-Weaver model of a communication system (Figure 2), while useful in describing discrete telecommunication events, cannot easily be generalized to telecommunication systems. It makes no difference that one of the authors was a telephone company engineer involved in computer design. The problem, in trying to apply this model to the situation of interest, is that it doesn't begin at the beginning. The questions must necessarily be different when the concern is meeting the information requirements of an organization than they will be when the concern is accurate communication of a message.

The model must be adapted. It is necessary to change the level of analysis, or to work on two levels. We have to look at the context, at what happens before the message is sent.

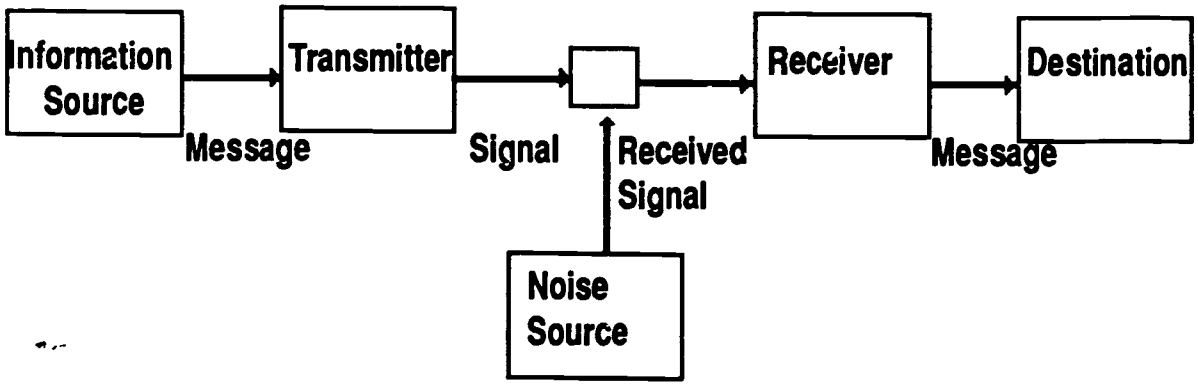
Ronald Rice's observation that "the channel of communication might be as important a variable in the communication process as source, message, receiver and feedback" (1984, p. 20) points toward the need for a two-level model. It reminds us of the importance of what too often is accepted as a content-neutral stage of the communication process. It is true enough to say as Frederick Williams does that communication technologies are "essentially extensions of traditional communication channels in space and time" (1987). But the explanation is inadequate. The addition of a highly technical stage to the communication process is a fundamental change in the nature

of communication. Mediated communication is much more than a simple extension of communication through time and space by virtue of the application of technology. Mediated communication changes everything, as we well know when we step back and look at the world around us. Wnat the Shannon-Weaver model cannot -- and presumably was never intended to -- do is to show how mediated communication can do all that.

We need to revise our models for mediated communication, if it is defined as a continuing process subject to change rather than as a series of discrete events. Jerry L. Salvaggio cites the Shannon-Weaver model as he castigates the Supreme Court for failing to "confront the communication process as a whole" (1983; pp. 96-97). There is merit to his argument. But, most especially when new communication technologies are involved, the Shannon-Weaver model doesn't confront the process as a whole either. Bruce Christie discusses five information models for organizations which, while recognizing to various degrees the importance of the channel, begin at the traditional point: the source (1981). A recently advanced model does look at the context of media use in organizations (Fulk, Steinfield, Schmitz and Power, 1987). This social information processing model puts the social context and the objective and perceived characteristics of the medium before media use behavior. This model appears to be more useful than the others examined; however, it, too, accepts media characteristics as a given. It does not yet address the power that lies in the medium and in those who manage it; it does not recognize that "telecommunications can be harnessed as a major new force for organizational design and redesign" (Keen, 1987) -- or that

Fig. 2

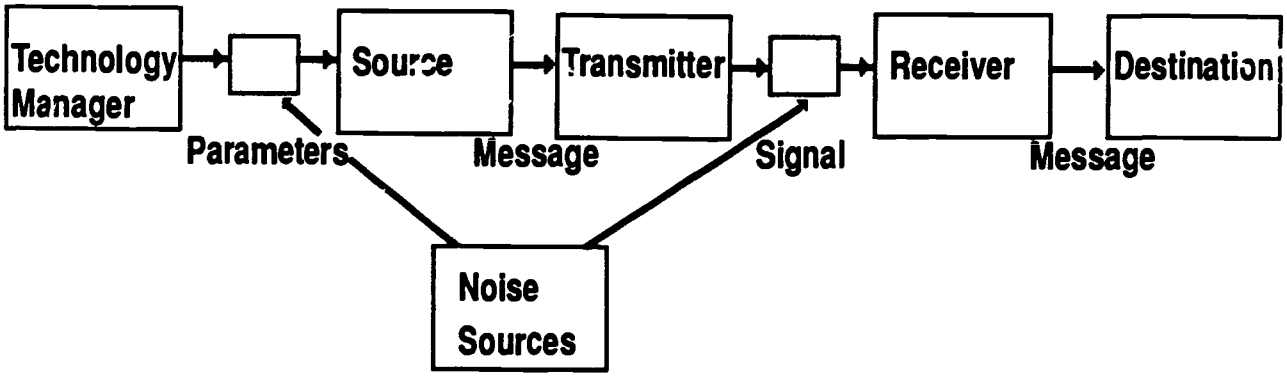
Shannon-Weaver Model of a Communication System



Source: Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication*, Urbana: University of Illinois Press, 1949.

Fig. 3

Control Model of an Information System



mismanagement of communication technology can lead to organizational chaos. It lets the technology manager remain in the shadows.

Just as new communication forms give rise to new ways of communicating, they can create new problems in communication. We need models that will help us recognize and address these problems, models that will encourage us to ask new questions such as: Who puts the transmitter and receiver in place? Who is responsible for the technology? Who does the technology manager listen to? And what are the consequences for users?

Technology managers deserve the same attention that professional communicators have long received. Their importance is recognized in management research (see, for example, Hunt and Newell, 1971; King, 1978; Edelman, 1981; McFarlan, McKenney and Pyburn, 1983) but media research has focused on other areas. Research into media institutions has tended to look at influences on the source -- the professional communicators -- such as professionalism (for example, Johnstone, Slawski and Bowman, 1972; McLeod and Hawley, 1964), demographic variables (Atkin, Burgoon and Burgoon, 1983), and socialization within communities (Tichenor, Donohue and Olien, 1980) rather than influences on the channel. Lee B. Becker did look at channel-related influences on messages in a study which found different orientations toward content between broadcast and print news gatherers (1982). He suggested organizational and industry constraints might explain the differences he observed. A recent review of such studies is provided by James S. Ettema, D. Charles Whitney and Daniel B. Wackman (1987).

In the telecommunication systems examined in this paper, the technology manager -- not the communication source -- has traditionally had the power. Ugbah and DeWine's study of computer-based communication systems in organizations provides some evidence that those who control the systems derive the greatest benefit from them (1987). But the technology manager has not been concerned with the content of the communication. Weaver, in explaining the model, separated information from meaning (Weaver, 1949, p. 8). So do Alaska's technology managers. Shannon and Weaver were interested less in what communications *do* say than in what they *could* say. This concern with the range of messages a channel might handle is less evident in Alaska's experience. Investigation of Alaskan telecommunication management activities shows that officials in different branches of state government have been uncomfortable with this reality for some time. It also shows that users have not always been represented well in telecommunication decisions.

So long as information systems are controlled by technology managers, the information conveyed by those systems is compromised. The meanings sources can attach to messages are constrained by circumstances beyond their control. Technical controls can affect the amount of information sent, the speed of delivery, the form that it takes, and who has access to it. DeFleur and Rokeach (1982, p. 134) point to the reduced role of feedback and role-playing in mediated communication. But the imbalance may be greater -- or the factors contributing to it may be less visible -- than their analysis suggests. Adding feedback and role-taking to the communication model makes

it easier to speak of communication as a continuing process, but it only reinforces the assumption that the process is functional.

In Alaska's telecommunication systems, and almost certainly in others, this assumption is highly questionable. In the telecommunication systems discussed in this paper, those receiving communications have been unable to communicate with the managers of the channels. In one department, for example, four employees brought their own Macintoshes to work daily because they wanted to graphically model problems that are so complex some have led to years of litigation. They could not get authorizations to purchase equipment and software with that capability. In another case, a state worker found he was unable to gain access to the database containing Attorney General's opinions because the password for the database had been changed. The opinions, of course, are public information. Theodore Lowi (1972), in a discussion of management, makes an argument that can easily be extended to the management of information technology: "When conduct [change this to "communication"] is influenced by manipulating the *environment of conduct* rather than conduct itself, it is most difficult to judge the manipulation, to criticize it, to oppose it, to plug different values into it."

Figure 3 shows how an information system might look if a technology manager is added to the Shannon-Weaver model. Such a system would contain noise at two points rather than one, because it now includes two communication processes. The clumsiness of an information system based on this model becomes more evident when feedback loops are included (Figure 4). The message originator gets

Fig. 4

Control Model of an Information System Showing Feedback

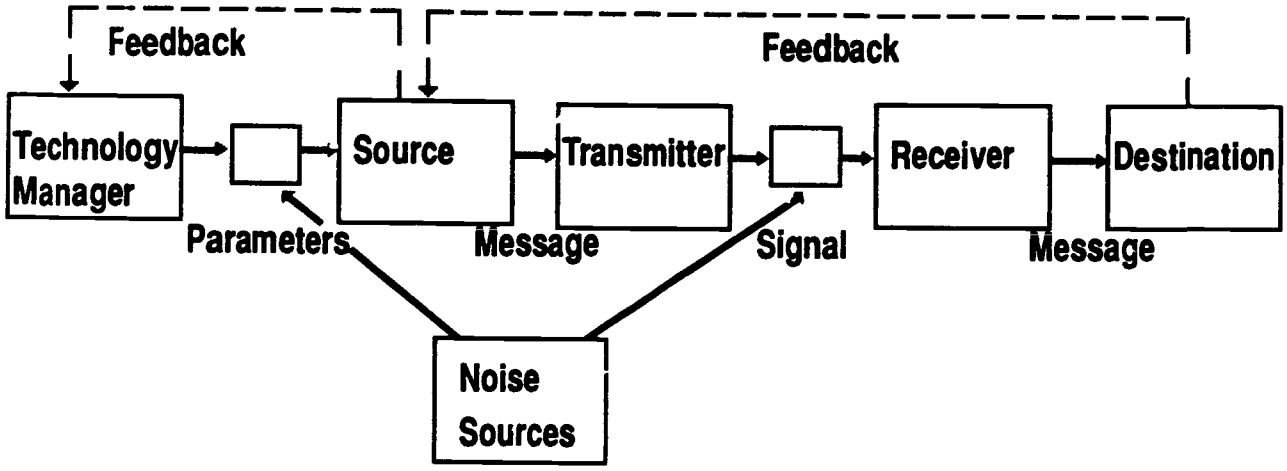
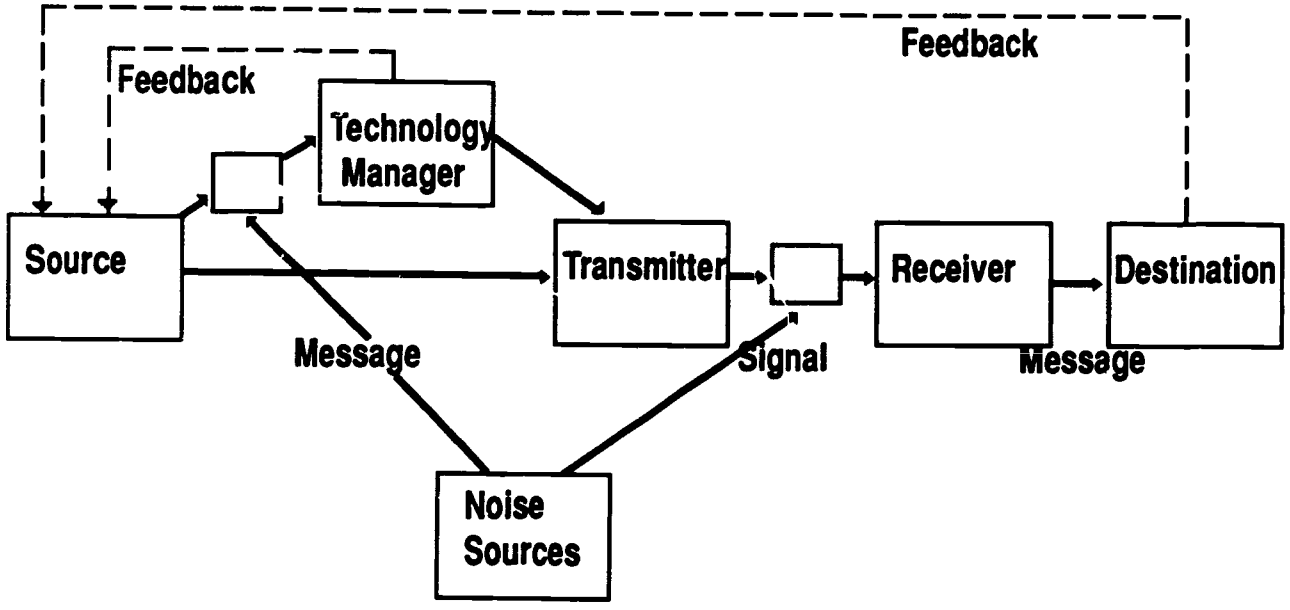


Fig. 5

Model of a Source-Controlled Information System



feedback from the recipient, and the technology manager gets feedback from the source. Thus, the technology manager is insulated from those at the message destination. While this system may be optimal if efficiency and economy of operation are the primary concerns, it appears to be flawed if content is of primary importance.

Figure 5 is a model for a system that transfers primary control from the technology manager to the source. The source sends messages over a system that is still managed by the technology manager. The difference is that now the source manages the technology manager. The source gets feedback about content from recipients and about the system from technology managers; when conflicting interests must be balanced, it is the source who now has the responsibility of doing it. It is now far easier to plan and maintain a system that is well-adapted to the content of the messages it carries. This is the system which the Telecommunication Information Council is intended to move Alaska toward. It is too early to say whether the Council is working with tools adequate to accomplish this task or whether enough of its members can be won over to this view of how information systems should be managed.

Therefore, two questions remain: Can the system depicted in Figure 4 be transformed into the system depicted in Figure 5? If it can be, how well will it work? Whereas private businesses have succeeded in making major changes in information management, the division of responsibilities between branches of government and the combination of entrenched bureaucracies with ever-changing administrators add to the complexity of such a task for a state government. The fact that change must take place in the most

political of all institutions adds yet another layer of complexity. It is instructive to note that, in Alaska's political process, it was felt necessary to leave even the definitions of "information resources" and "information systems" ambiguous. While for Shannon and Weaver information did not necessarily have any meaning, Alaska's political leaders have given information many meanings.

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