THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY: A PRELIMINARY ASSESSMENT

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I. INTRODUCTION

The National Science Foundation's State Science, Engineering and Technology (SSET) program began making grants to state legislatures and executives in 1977 for studies assessing science information systems in each branch of state government. Alaska's grants went to the Office of the Governor and the Legislative Affairs Agency. The executive grant supported groundwork for a legislative proposal that resulted in creation of the Alaska Council on Science and Technology in 1978. The legislative grant, which became available as the council was itself coming into being, was directed toward an assessment of the council's initial development phase. The result is this combined legislative-executive study report on the Alaska Council on Science and Technology (ACST), which is a creature and instrument of both legislative and executive branches of Alaska state government.

The ACST is authorized to survey "research needs of the state" and recommend priorities for research funding to the governor and legislature. This charge is construed very broadly, spanning a wide range of policy research that may draw on the physical, biological and social sciences, engineering, and other applied and professional fields. At the request of the governor or legislature, the council is to provide scientific advice on state policy issues. The council is also authorized to award research grants and contracts, to promote appropriate standards for research, and to establish committees and task forces of scientists

and other experts to help accomplish its tasks. The seven government, academic, and public members of the council are appointed by the governor and confirmed by the legislature.

This report discusses Alaska's science council against the background of the national SSET program, focusing on the organization and activities of the council during its first year. Although this is a very brief period, the council's early moves toward a longer term organizational identity and role provide some grounds for a preliminary assessment of emerging goals, means, and plans.

The council and its staff provided much of the information for this report. We attended most of the council's meetings and public hearings, interviewed all council members, and had full access to council documents. We also selectively interviewed state legislators, agency staff members, and others associated with SSET. Background materials on the SSET program and reports on projects in other states also contributed to the information base. Finally, we selectively reviewed the general published literature on problems of linking professional scientific inquiry with public policymaking, a literature which unfortunately seems to have been neglected by many of the practitioners and evaluators of SSET. The interviews, documents, and published sources are cited in footnotes and listed at the end of this report.

II. SSET PROGRAM AND STATE POLICYMAKING

The State Science, Engineering and Technology (SSET) program represents an attempt to overcome several barriers that traditionally have separated scientists--particularly academic scientists--from politicians and other government policymakers. Among these barriers are differences between the world of science and the world of policy and action in professional incentives, penalties, and rewards; in institutional goals, norms, and practices; and, ultimately, in cultural and intellectual values. A rather voluminous and still growing literature has provided extensive documentation and commentary on the prevailing state of affairs.[1] This literature, together with practical experience in many state governments under SSET and earlier efforts, suggests essentially that opportunities for wedding professional scientific inquiry to public policymaking may be much more elusive and probably fewer than the advocates of such a marriage would like to believe.

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[1] Although oriented primarily toward the social sciences, Charles E. Lindblom and David K. Cohen, Usable Knowledge (New Haven: Yale University Press, 1979), would be a good place to begin a serious literature review. Carol H. Weiss, ed., Using Social Research in Public Policy Making (Lexington, Mass.: D.C. Heath and Company, 1977) provides a good survey of some of the more familiar institutional problems. Barry Bozeman and L. Vaughn Blankenship, "Science Information and Governmental Decision-Making: The Case of the National Science Foundation," Public Administration Review, Vol. 39, No. 1 (January/February 1979), pp. 53-57, is an especially revealing and ironic comment on the uses (really, the non-uses) of scientific information in policy and program planning by NSF officials. Also see Jeffrey Apfel and John A. Worthley, "Academic Technical Assistance: The University and State Government," Public Administration Review, Vol. 39, No. 5 (September/October 1979), pp. 408-414.

In this part of the report, we briefly review the background of the SSET program, basic forms that science information or advisory systems have taken in the states, and some lessons that have been drawn from states' experiences with these systems. We also indicate that Alaska's Council on Science and Technology, although initially assisted by SSET, is taking a tack quite different from that generally prescribed by SSET. Subsequent parts of the report describe the council's first year directions and discuss some longer range implications of its somewhat deviant course.

SSET Program Background

In 1977, the National Science Foundation announced the State Science, Engineering and Technology grants program to help state governments study ways -- including establishment of formal science advisory organizations -- of making scientific and technological information more accessible and useful to policymakers. Under this program, states could apply for grants to help them "identify the need for, and the contributions that can be made by, policy analyses, research results, and scientific, engineering and technical resources in the policy-formulation and decisionmaking process. . . in both the Executive and Legislative branches".[2]

State executive and legislative branches began experimenting with science advisory systems nearly 20 years ago, but many of these systems

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[2] National Science Foundation, Program Announcement, State Science Engineering and Technology Program, 1977, p. 1.

had gone unused by policymakers.[3] In 1977 a Pennsylvania State University professor who had been involved with early attempts to set up state science advisory organizations reported that the most commonly used systems--science and engineering foundations, science advisory groups, and science advisors--were largely "defunct, moribund or vacuous."[4] At the same time, an official of the National Governors' Association reported that of 18 science councils that had previously been established to advise governors, 11 were inactive by 1977.[5]

Thus, the 1977 SSET study program was to help states determine ways of establishing workable science advisory systems by examining, among other things, reasons why so many earlier systems had failed. Forty-nine governors' offices and forty-two legislatures each received $25,000 SSET grants, with states agreeing to partially match this federal money. The science foundation's program announcement did not specify just what was to be included under "scientific, engineering and technological" information, and states have variously defined the category to cover a range from the physical and biological sciences and various fields of engineering to economics, other social science disciplines, and eclectic "policy studies."

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[3] For more history of early science advisory systems, see Harvey M. Sapolsky, "Science Advice for State and Local Government," in Science, Vol. 160, April 15, 1968, pp. 280-284.

[4] Irwin Feller, "The Science and Technology Experience at the State Level: An Overview," paper presented at Atlanta Workshop for State Science, Engineering and Technology Program, Atlanta, Georgia, November 3 and 4, 1977.

[5] Lynn Muchmore, "Science, Technology and Gubernatorial Policymaking," paper presented at Atlanta Workshop for State Science, Engineering and Technology Program, Atlanta, Georgia, November 3 and 4, 1977.

The SSET program and earlier efforts to bring scientists closer to decisionmakers had two objectives: to strengthen state policymaking and to improve transfer of new technologies from the federal to state governments. These objectives were explained in an early workshop held for SSET grant recipients:

> Modern technology is changing at an overwhelming pace while state governments too often have been slow adapting to . . . rapidly expanding knowledge. The increasingly pressing demand for action to resolve the numerous technical problems . . . which impinge upon our daily lives, requires that the state develop a higher level of technical expertise.
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> . . . . . .
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> The sources of scientific knowledge are many and varied. The federal government, in particular, sponsors thousands of projects with an annual research and development budget of some 14 billion dollars. Yet the linkage between the federal research establishment, as a supplier of new technologies, and state governments, where many of these technologies could be put to use, is extremely weak.[6]

Behind this rationale for the SSET program lay several assumptions, some of which were outlined in a 1977 presentation to recipients of SSET executive branch grants. (Although referring specifically to governors' use of science information systems, similar assumptions can be applied to legislators' use of such systems.) Essentially, an SSET-type effort assumes "that governors encounter issues whose resolution pivots upon scientific judgements, that governors recognize scientific/technological issues, [and] that they will channel those issues into a specialized policy apparatus."[7] More broadly on the issue of the effect of

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[6] National Governors' Association, SSET Project, foreword to collection of papers presented at Atlanta Workshop for State Science, Engineering and Technology Program, Atlanta, Georgia, November 3 and 4, 1977.

[7] Muchmore, "Science, Technology and Gubernatorial Policymaking."

"problem-solving" studies on policy, a close student of research-policy relationships is worth quoting at some length:

> It probably takes an extraordinary concatenation of circumstances for research to influence policy decisions directly: a well defined decision situation, a set of policy actors who have responsibility and jurisdiction for making the decision, an issue whose resolution depends at least to some extent on information, identification of the requisite informational need, research that provides the information in terms that match the circumstances within which choices will be made, research findings that are clear-cut, unambiguous, firmly supported, and powerful, that reach decision-makers at the time they are wrestling with the issues, that are comprehensible and understood, and that do not run counter to strong political interests. Because chances are small that all these conditions will fall into line around any one issue, the problem-solving model of research use probably describes a relatively small number of cases.[8]

Despite, or perhaps because of, the difficulty in approximating such conditions of research effectiveness, the SSET program has increasingly tended to concentrate on the forging of very specific, narrow-gauge links between scientific information or research, on the one side, and policy decisions, on the other.

Types of Science Information Systems

The six most common types of science information systems that governors' offices have used or plan to try are summarized in a 1978 evaluation of the SSET program prepared by the National Governors'

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[8] Carol H. Weiss, "The Many Meanings of Research Utilization," Public Administration Review, Vol. 39, No. 5 (September/October 1979), p. 428.

Association:

1. Persons with scientific or technological knowledge in planning or similar offices within central management agencies;

2. Science advisors to the governor;

3. Offices of science and technology;

4. Development of means of obtaining scientific information for resolving specific problems;

5. Science advisory councils; and

6. Development of methods for using scientific and technological information available from state universities.[9]

Like the proposed or existing science information systems for governors' offices, such systems for legislatures fall, with variations, into several main types, as noted in a 1978 report on the SSET program:

1. Science and technology offices within legislative agencies;

2. Science advisory councils;

3. Liaison offices to link legislators with university and private industry experts;

4. Scientists on legislative staffs; and

5. Banks of scientific and related information, or lists of experts in various fields to be called on when needed.[10]

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[9] National Governors' Association, "SSET at Mid-Stream: An Interim Assessment," submitted to the National Science Foundation, August 14, 1978, pp. 11-14.

[10] SRI International, "Increasing the Capacity of State Governments to Access and Use Scientific, Engineering and Technical Resources," prepared for National Science Foundation, January 1979, p. 71.

Several evaluations of the SSET program emphasize that each state must determine for itself what kind of information system is best suited to its needs, and that there is no one "best" system that would be effective in all states.[11] However, based on surveys of failures of many earlier systems, these evaluations and other reports have tended consistently to cite certain characteristics that have helped make science information systems work:

1. Science information systems work best when they are established as a part of an existing "policy development apparatus," such as a planning office in a central management agency, or are otherwise able to integrate themselves into legislative or gubernatorial policymaking processes.[12]

2. Science information systems should be set up to deal with specific problems; otherwise, they will not have the "operational significance" to insure their use by policy makers.[13]

3. When asked for information or advice, science organizations should supply concise, straightforward information as quickly as possible.[14]

4. Legislative and executive branches have different policymaking processes and information needs; therefore, states must determine what type of science information system would be best suited to each branch.[15]

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[11] National Governors' Association and SRI International reports cited in footnotes 9 and 10; also National Conference of State Legislators, "State Legislators' Response to the State Science, Engineering and Technology Program," submitted to the National Science Foundation, August 14, 1978.

[12] Muchmore, "Science, Technology and Gubernatorial Policymaking."

[13] Ibid.

[14] Interviews with and presentations by recipients of SSET legislative branch grants at Annapolis Workshop, November 29-December 1, 1979.

[15] SRI International, "Increasing the Capacity . . .," p. 69.

In general, the more successful science information systems appear to be relatively small-scale agencies that fit with minimum friction into established state government routines and processes. They have set out not to build new planning processes and programs or to raise new or expansive policy issues, but rather to respond expeditiously to legislative and executive requests for information and analysis on relatively limited and specific problems. They are probably best described as incremental additions to the technical support staff structures of state government, rather than as substantial research, planning, or policy analysis organizations in their own right.

Alaska Council on Science and Technology

The Alaska State Legislature created the Alaska Council on Science and Technology (ACST) in 1978. SSET executive grant funds were used to support some initial staff work in the Governor's Office on the proposal for such a council, and this 1977 support is virtually the only connection between the national SSET program and Alaska's ACST. During 1979, its first year of existence, the Alaska council moved in a quite different direction than other SSET-assisted organizations, which are mostly confined to responding to legislative or administrative requests for information. Established to serve both executive and legislative branches of state government, the council has a uniquely broad mandate to survey research needs, recommend priorities, award grants and contracts, and give advice to the governor and legislature.

In 1979, the council directed its main efforts toward two of its principal legislative purposes: the determination of state research needs and priorities and development of a research grant and contracting program. During the year, the council received no specific requests for information from the governor's office, and it received only a couple of informal requests from individual legislators and legislative staff members.

The next two parts of this report describe the organization and activities of the council and generally assess its directions and prospects after its first full year of operation.

III. ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY-- ORGANIZATION AND ACTIVITIES

Origins

More than a decade ago, a group of University of Alaska scientists began calling for the establishment on the state level of organizations that would be modeled after the National Academy of Sciences, the National Research Council, and the National Science Foundation, and which would in various ways bring scientific information into government decisionmaking.[1] Basically, the state academy of sciences would be made up of Alaska experts in all scientific fields who could be called on to provide information needed by government decisionmakers. The state research council--a group of six or eight scientists primarily selected by the academy--would act as a science policy planner and evaluator, and as a coordinator between government and scientists. Among other things, the council would receive requests for research information from legislators or administrators, decide what research was necessary, and assemble expert panels and committees to develop research reports and recommendations. The state science foundation would, like the National Science Foundation, award and administer research grants for projects to meet state research needs and respond to council and academy recommendations.[2]

In late 1977, a group representing the state legislature, the University of Alaska, and state executive agencies formed a committee to

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[1] See, for example, David Hickok, "An Examination of the Alaska Academy of Science and Technology/Alaska Research Council Concept," a discussion paper, August 1977; Resolution No. 1, AAAS, Alaska Division, 28th Alaska Science Conference, 1977.

[2] Ibid; also interviews with Alaska Council on Science and Technology members David Hickok and Neil Davis.

work toward establishment of a system to bring scientific information more effectively into government decisionmaking. Several of the committee members were among those who had supported creation of the three-part science research network described above, but the group saw no chance for legislative approval of three new organizations. Instead, they concentrated on establishment of a single council with basic authorities that subsequently could be used to develop entities like an academy of sciences and a research foundation.[3]

This committee singled out the setting of research priorities as the most important task an Alaska science advisory group should undertake, with other jobs--such as providing information specifically requested by legislators--also noted as important.[4] The chairman of the committee, Terry Gardiner, now speaker of the Alaska House of Representatives, hoped that any such science advisory group formed would consider competing demands for Alaska resources and for research dollars, set priorities for resource-related research and, in general, make scientists more aware of the kinds of information needed by government officials.[5]

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[3] Interviews with Alaska Council on Science and Technology members David Hickok and Neil Davis.

[4] Memorandum from Terry Gardiner to Alaska Resource Research and Development Ad Hoc Committee and Committee Advisory Group; subject: Alaska Research and Development Council, September 16, 1977.

[5] Ibid.

Council Membership[6]

The 1978 law establishing the council requires the governor to appoint seven members for overlapping three-year terms and specifies that council members must represent certain groups: "Two members shall be selected from different executive departments of state government having significant research activities, two members shall be selected from the Alaska academic community, two members shall have significant activities or direct interests in research and shall be selected from the general public, and one member shall be selected from the staff of the legislature."[7] The governor appointed the council, all appointees were confirmed by the legislature, and the group began meeting in December 1978.

Several of the council members originally appointed by the governor had worked on the committee that had pressed for creation of the council. These members from the original committee were: David Hickok, head of the University of Alaska's Arctic Environmental Information and Data Center; Neil Davis, professor of geophysics at the university's Geophysical Institute; and Richard Holden, at that time deputy commissioner of the state Department of Transportation and Public Facilities. Hickok and Davis represented the academic community on the council, while Holden filled one of the state agency positions.

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[6] Discussion in the following section is based on notes of Alaska Council on Science and Technology 1979 meetings, interviews with council members and executive director, and other sources as noted.

[7] Alaska Statutes 44.19.181.

Other original members of the council were: Mim Dixon, an anthropologist and private consultant; Gregg Erickson, at that time director of the Legislative Affairs Agency's Division of Research Services; Richard Straty, director of marine investigations for the federal National Oceanic and Atmospheric Administration's fisheries lab near Juneau; and Ronald Skoog, commissioner of the state Department of Fish and Game. Dixon and Straty were appointed as public representatives on the council, while Erickson represented the state legislature and Skoog a state agency.

During 1979, three council members resigned and were replaced. Erickson resigned when the Division of Research Services he headed was abolished by the state legislature; he was replaced by Jay Hogan, head of the Legislative Finance Division. Holden left the council when he resigned as deputy commissioner for the Department of Transportation and Public Facilities; he was replaced by Ernest Mueller, head of the state Department of Environmental Conservation. Skoog resigned because of time conflicts; he was replaced by Robert Burkett, an official of the Fisheries Rehabilitation and Enhancement Division of the Department of Fish and Game.

The council met eight times in Juneau, Anchorage, and Fairbanks during 1979. Most of its first meetings were devoted to basic organizational matters, such as writing by-laws and electing officers. Richard Holden, representing a state executive agency, was elected interim chairman, and Neil Davis of the University of Alaska was elected interim vice

chairman. In June, the council elected officers for the coming fiscal year--Davis was shifted from vice chairman to chairman, and Holden was shifted from chairman to vice chairman. When Holden resigned, Richard Straty, who works for a federal agency but fills a public member's seat on the council, was elected vice chairman.

The council has a staff of two--an executive director and a secretary--who maintain an office in Juneau. The organization had a fiscal year 1980 budget (not including costs of the northern technology grants program, discussed later) of about $101 thousand. In fiscal 1981, the council expects to have a budget of about $110,000 (again excluding the northern technology program).

Alaska Council Law

The law establishing the Alaska Council on Science and Technology gives the seven-member council broad responsibilities and somewhat vague authorities. As noted earlier, the council is "to review and recommend the scientific and technological research needs of state government, to issue research grants and contracts, to oversee the issued grants and contracts, to promote high standards of research for the priorities proposed by the council, and to address stated legislative or administrative requests for research."[8] In carrying out these responsibilities, the council "may" do certain things and "shall" do certain others.

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[8] Alaska Statutes 44.19.182(a). See Appendix for full text of the Science and Technology Act.

The council may:

(1) apprise itself of local, state, federal and private research programs, activities, and needs;

(2) convene committees, task forces, conferences, public hearings, and other meetings necessary to carry out the council's purposes;

(3) award research grants and contracts on a fair and competitive basis and administer those grants and contracts;

(4) enter into agreements creating one or more systems of information exchange with any appropriate research funding sources;

(5) at the request of any state agency, enter into and administer, but not perform, the research under research grants and contracts funded by that state agency;

(6) investigate the need for and when necessary establish advisory committees for reviewing its program;

(7) request and receive from any agency of the state government the assistance and data needed to carry out the requirements of this section;

(8) hire an executive director and staff that may be necessary to implement . . . this chapter.[9]

And the council shall:

(1) develop methods of surveying research needs of the state, based on the present and future information needs of policy makers, state agencies, and the public at large;

(2) annually review the research needs and propose priorities for funding;

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[9] Alaska Statutes, 44.19.182(b).

(3) annually submit to the governor and the legislature the findings of the council, including a listing, description, ranking, and justification of research needs, and a commentary on significant research activities of the preceding year funded by the state and including the relationship of such research to the state's needs and priorities;

(4) promote and enhance standards for research activities for which the council has administrative oversight;

(5) establish review procedures for research proposals;

(6) at the request of either the governor or the legislature advise in a timely fashion on inquiries concerning scientific investigation or comment;

(7) evaluate and forward to appropriate agencies and persons products of research activities funded by the council; the council shall prepare comments to accompany research reports summarizing the applications, importance, or further research needs demonstrated by the findings of council-supported research.

(8) coordinate its data and information needs with other research organizations in order to avoid unnecessary duplication;

(9) not conduct any research itself other than that necessary to further the purpose of the council as provided in . . . this section;

(10) supply to any person or agency requesting assistance the available information on past or present research activities for which the council has information, except that the council shall not release information which may endanger the acceptance of any research proposal which is at the time competing with other proposals for funding.[10]

Council Activities[11]

After their initial organizational meetings, the council began concentrating on several program development tasks:

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[10] Alaska Statutes, 44.19.182(c).

[11] Discussion of council activities based on minutes and notes of 1979 Alaska Council on Science and Technology meetings.

1. surveying state research needs

2. establishing a system for setting priorities for research

3. drawing up lists of experts and establishing scientific panels or committees

4. establishing contacts with legislators, administrators, and national and state science organizations, and

5. preparing reports to the legislature and governor's office on its findings and research recommendations for the year.

In addition to these specific tasks, the council in 1979 also began discussing strategies and tactics to achieve a larger goal: establishment of a "science foundation" organization to award research money that the council would seek from the legislature in coming years.

Most of these early activities correspond to goals the pre-council committee and others had held for an Alaska science advisory organization: The committee had singled out development of research priorities as the most important job for an Alaska research council, the council's rosters of experts may be viewed as building blocks for an academy of sciences, and establishment of a science foundation for awarding research money was also a prominent part of earlier discussions.

Throughout its early months, the council grappled with the problem of how to survey research needs, debating how to approach state policy-makers and scientists and what questions to ask. The council considered and rejected several possible methods of surveying research needs and ultimately held public hearings, distributed a questionnaire to Alaska

scientists, and interviewed legislators and administrators. Toward the end of the year, the council also decided to establish ten committees of experts in various fields--renewable resources, energy, and agriculture, for instance--to prepare reports for the council on what research has been done in these areas, what ought to be done, and what research priorities should be set. Earlier in 1979, the council had formed a seismology committee to look at problems in that area; this committee was an early model for the committees established in early 1980.

How the council will deal with the diverse array of recommendations and information it has collected and report its research findings and recommendations to the legislature and the governor has yet to be resolved.

The council in 1979 also began discussing and planning for establishment of a science foundation program to award and administer research money. The council anticipates that, as it establishes its network of scientific committees (the "academy" model) and recommends priorities for Alaska research, the legislature will appropriate research money to be awarded through the council. Having unsuccessfully tried to persuade the governor to include $1.5 million in his fiscal 1981 budget for establishment of a foundation, the council explored, in early 1980, an alternative strategy of seeking legislative appropriations directly to the council, without a new and intermediate foundation structure.

Legislative and Administrative Contacts

As noted earlier, the council in 1979 received only a few informal information requests from the legislature. The House Commerce Committee asked the council to outline how information on technologies developed by the federal government is transferred to states, and the council's executive director responded with a several page description. A legislative committee asked the council how the council might contribute to a state alternative energy development program, if such a program were developed; the council decided it would help pay travel costs of expert witnesses the legislature might ask to testify.[12]

The council received no requests for information from the governor's office during the year, but the council's executive director talked regularly with members of the governor's staff, particularly those in the Division of Policy Development and Planning.[13] The council was administratively located within the Office of the Governor during 1979, but in early 1980, in a move to reduce the number of councils and boards within the Office of the Governor, the governor proposed to shift the council to the Department of Environmental Conservation.[14] The council objected to this shift on the grounds that because of its "broad role," the council would be "most likely to maintain and improve its usefulness to

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[12] Interviews with council's executive director (telephone), December 20, 1979, and January 10, 1980.

[13] Ibid.

[14] Alaska Legislature, House Journal, January 14, 1980.

the state if it remains administratively in the Office of the Governor."[15]

Northern Technology Program[16]

The council's most concrete relationship with the legislature in 1979 was initiated by a legislator who asked the council to agree to administer a small grants program that he was then proposing in the legislature. In early 1979, the legislature began considering the $50,000 program, which would provide grants to Alaskans with ideas for developing or improving small-scale technologies suited to Alaska's conditions.

The legislator sponsoring the bill originally called for the program to be administered by the Office of Northern Technology, within the Office of the Governor, but he later decided that the grants could be awarded faster, with less red tape, and with lower administrative costs by a group like the science council that was outside established executive agencies. The council agreed to issue and administer the grants, emphasizing that

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[15] Letter from T. Neil Davis, chairman, Alaska Council on Science and Technology, to Governor Jay Hammond, January 15, 1980.

[16] The following discussion of the Northern Technology grants program is based on meeting notes from council meetings of March 22-23, 1979, September 20-21, 1979; interviews with Neil Davis, chairman, Alaska Council on Science and Technology, Fairbanks, September 20, 1979; and Christopher Noah, Alaska Council on Science and Technology executive director, Fairbanks, September 20, 1979; and other references as noted.

its main objective would be to award the money quickly, keeping administrative controls to a minimum.[17] The council saw this small grants program as an opportunity to increase its visibility with both the legislature and the public and to demonstrate that it could react quickly to legislative requests.

The council received 180 proposals for grants, and the chairman of the council asked about 15 scientists and engineers, primarily from the University of Alaska, to review the proposals. Based on recommendations of the volunteer scientists and their own reviews of the proposals, the council awarded 20 grants ranging from $200 to $5,000; this review and awarding process was completed within a month's time. The legislator who sponsored the northern technology program intended to ask for $150,000 in grants during the 1980 legislative session, with the council again to award the grants.[18]

Other Agencies and Organizations[19]

The council decided in one of its first meetings that it would be necessary to establish "a broad base of support" both within and outside

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[17] Letter from Richard Holden, interim chairman, Alaska Council on Science and Technology, to Clem Tillion, senate president, Alaska State Legislature, March 29, 1979.

[18] Presentation to Alaska Council on Science and Technology by Representative Brian Rogers, Alaska Legislature, September 21, 1979.

[19] Discussion of the council's relationships with other organizations and agencies is based on minutes and notes of 1979 Alaska Council on Science and Technology meetings, and other sources as noted.

the science community, and during 1979 it made contact with a number of state and federal government agencies and other organizations.

In state government, council members and the executive director talked with legislators and administrators, informing them of the council and asking state officials what research they felt was needed in Alaska. The council also hired a consultant to interview legislators and administrators and more formally collect opinions on needed state research.[20] Representatives of the Department of Commerce and Economic Development's Division of Energy and Power Development, the Office of Northern Technology in the Office of the Governor, and the Alaska Renewable Resources Corporation also talked to the council about how these organizations could cooperate.

The agency in state government that potentially could work most closely with the council is the Alaska Renewable Resources Corporation (ARRC). A semi-autonomous state body designed to promote development of Alaska's renewable resources, ARRC can under law receive five percent of certain receipts paid the state from mineral lease bonuses and rentals for state land and royalties derived from minerals produced on state land[21]--a figure that is already in the millions and which will grow substantially in upcoming years. The corporation is to invest this money in "projects which are economically viable and income-producing," but it

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[20] "Alaska State Government Legislative and Executive Branch; Responses and Comments on Scientific and Technological Research Needs in Alaska," Alaska Council on Science and Technology, 1979 (draft).

[21] Alaska Statutes, 37.12.020.

can also "provide grants for projects having broad public application which do not have direct income-producing potential."[22]

Most significant for the science council is that the corporation can by law also provide funds to the Alaska Council on Science and Technology for council grants for projects that might further the corporation's renewable resource development aims.[23] The corporation has not yet awarded any money to the council, but members of the two organizations have discussed the possibility, and in 1979 the council reviewed several ARRC grant proposals for the corporation.

The council's biggest effort to consult with other science groups came at the annual Alaska Science Conference in September, when the council held joint hearings with the Polar Research Board of the National Academy of Sciences on scientific and technological research needs in Alaska. Representatives of the University of Alaska, the Polar Research Board, the Cold Regions Research and Engineering Laboratory, the Institute of Northern Forestry, the Bureau of Land Management's OCS Environmental Assessment Program, and others participated in the hearings.

Several science organizations asked the council to help pay for scientific meetings and conferences during the year. The council paid

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[22] Alaska Statutes, 37.12.070(11).

[23] Alaska Statutes, 37.12.070(16).

the travel costs of Polar Research Board members attending the September Alaska Science Conference, and agreed also to help pay costs of a group of Soviet scientists scheduled to be in Alaska in late 1979, a trip that was later cancelled. The biggest request for council money came from the University's Geophysical Institute, local organizer of the Fourth International Permafrost Conference, scheduled to be held in Fairbanks in 1983. The council agreed to ask the legislature for $100,000, which would be earmarked for the conference in the council's budget. At the same time, the council adopted a policy for dealing with future requests for money: the council will support only those meetings and conferences in which it is directly involved, and may help pay costs of other meetings by requesting specific appropriations to be earmarked in its budget.[24]

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[24] Alaska Council on Science and Technology meeting minutes, October 29-30, 1979.

IV. ACST PROBLEMS AND PROSPECTS

As reflected in its emerging goals and ambitions, the Alaska Council on Science and Technology (ACST) is diverging substantially from the national SSET model and from that model's relatively limited and modest aims for linking science and public policymaking. Starting in late 1978 with somewhat ambiguous and open-ended statutory authority, the council has begun moving toward establishment of a semi-autonomous state science research organization with potentially extensive research policy, planning, and funding powers in future years. Before it achieves such status, however, the council will likely be forced to confront and resolve several conflicts of objectives and interests already apparent in its early phases of development.

This part of the report presents a tentative assessment of the council's first year and its prospects for future years by commenting on (1) the contrast between ACST and SSET objectives, (2) ACST origins and authority, (3) the diverse and sometimes conflicting interests and pressures acting upon and within the council, and (4) ACST's current structure and activities.

SSET and ACST

The national SSET program has, on the basis of experience in several states, recommended that state science information systems focus on the immediate and short-term needs of legislatures and governors. Given the

difficulties of effectively bridging gaps between state scientific and political institutions, and the generally poor record of past attempts, SSET encourages a focus on specific and practical means by which scientists can bring needed information to bear on well-defined policy issues. In effect, the SSET program has adopted a "think small" approach combined with an orientation to concrete payoffs through the efficient provision of information services to state policymakers. SSET prescriptions reflecting this approach and orientation were described above: state information systems should (1) be fitted into and accommodate existing policy processes, (2) focus on specific task assignments, (3) provide quick, straightforward responses to legislative and administrative requests, and (4) separately accommodate differences between legislative and administrative structures and processes.

ACST, in contrast, is attempting to "think big" and appears to be aiming toward a much larger and longer term set of payoffs than those associated with the SSET program. Instead of focusing on specific policy research and information needs, and more immediate and concrete results in the legislative and administrative decisionmaking process, the council is setting out to build a new institution that would be controlled largely by the science community. Patterned on the National Academy of Sciences-National Research Council and the National Science Foundation models, this new institution (or set of institutions) would have the funds, prestige, political support, and other resources necessary to play an important, long-term role in Alaska policy research affairs. Thus, contrary to SSET

prescriptions noted above, the Alaska Council is (1) creating a new structure and process outside of existing policy structures and processes, (2) raising its level of concerns quite above and beyond specific policy information tasks, (3) not promoting legislative or administrative requests for information on specific policy issues, and (4) including both legislative and executive branches of state government within the broad scope of its program.

ACST Origins and Law

As discussed earlier, this expansive version of an Alaska policy research organization grew out of discussions among Alaska scientists, based primarily in the university, during the late 1960's and early 1970's. It was this version, too, that university participants brought to the Ad Hoc Committee on Research and Development in 1977, which developed and promoted the ACST legislation passed by the legislature in 1978. (The principal university members of the committee were David Hickok and Neil Davis, both now members of the council.)

The legislator-member of the committee, Terry Gardiner (now speaker of the Alaska House of Representatives), had a more limited concept in mind, an Alaska Research and Development Council, that would focus on "resource related" research, particularly renewable resources development issues affecting fisheries, agriculture, and other industries.[1] Gardiner

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[1]Memorandum from Terry Gardiner to Alaska Resource Research and Development Ad Hoc Committee, Subject: Alaska Research and Development Council, September 16, 1977.

proposed that such a council should establish research standards and priorities as well as "respond to administrative and legislative needs for statements of scientific finding with respect to specific requests from either of these branches of government. . ." Gardiner was explicit about the applied policy purposes of his proposal, emphasizing "the need for state government to have its needs identified to the research community" by a "body which considers all the competing uses of Alaska resources [and] the competing demands placed upon research dollars."[2]

In the final version of the ACST bill passed by the legislature, Gardiner's concept of the council, including its membership provisions, tended to prevail. However, his emphasis on "resource related" research did not appear in the final legislation, and a provision was also included that the council "may award research grants and contracts," subject, of course, to legislative appropriation.

One provision appearing in an early draft of the ACST bill drew particularly strong opposition. It provided that "state money may not be spent for research projects, unless, before commencing the research, the agency or person responsible for conducting the research submits to the council for its review and comment a scope of work proposal. . ."[3] Both the commissioner of the Alaska Department of Fish and Game and the director of the University of Alaska's Geophysical Institute opposed this provision.

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[2] Ibid.

[3] CSHB 722, Sec. 44.19.211.

Their fear was that it would authorize undue and improper interference with their own research programs, which are among the largest in the state.[4] The department's research efforts are applied, heavily oriented toward data collection, and depend primarily on state money. The institute's are primarily basic, analytical, and only partly dependent on state money. Both, however, would have been directly subject to the offending provision, which was dropped from the bill.

As it passed through the legislative process, the ACST bill was broadened with general language, which could accommodate expansion of council functions and authorities in future years, and potentially offensive or threatening language was eliminated. The tri-partite National Academy of Sciences-National Research Council-National Science Foundation (NAS-NRC-NSF) concept did not appear in any bill considered by the legislature. However, the council's broad authority to survey research needs, recommend priorities, establish advisory committees, and award research contracts and grants provided a broad legal base for further development of the council's program potentially along NAS-NRC-NSF lines. At the same time, the broad scope and ambiguity of the law left ACST's role and purposes open to alternative definitions and subject to the influence of other interests that might not necessarily share the university scientists' visions of a state science research organization.

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[4]Memorandum from Ronald Skoog, commissioner, Department of Fish and Game, to Keith Specking, special assistant to the governor, Subject: CSHB 722, May 19, 1978; and letter from Juan G. Roederer, director, Geophysical Institute, to Governor Jay S. Hammond, May 3, 1978.

Interests and Pressures

Several organizations and interests within and outside of state government can potentially affect the future character of the Alaska Council on Science and Technology, the combination of objectives it pursues, and its relative success or failure in achieving them.

State Legislature

With its powers of oversight and appropriation, the legislature has probably the greatest potential to affect ACST's future, and council members tend to look to the legislature as their primary sponsor and source of support. The legislature, however, is a complex structure incorporating a broad range of interests that can impinge upon the council in different and conflicting ways. Some legislators believe that the council will serve best by providing "pre-digested" and "simple answers" to specific questions.[5] Others think that the council should identify research needs and priorities, focusing on large and complex state resource development issues and preparing broad research agendas.[6] And still others--probably the majority of legislators--have very limited or no expectations for the ACST, being either unfamiliar with the council or skeptical that such a body is needed at all. But the council has already succeeded in commending itself to some legislators by assuming responsibility for administering the Northern Technology grants program. In doing so, ACST enabled

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[5]Remarks of Senate President Clem Tillion at ACST meeting of February 19, 1979, Juneau.

[6]Remarks of House Speaker Terry Gardiner at ACST meeting of February 19, 1979, Juneau.

the interested legislators to by-pass the executive bureaucracy while increasing its own visibility and credibility before the legislature and affected segments of the public.

Executive Agencies

The council's relationships with agencies of the executive branch have so far been minimal, the most significant being with the Office of the Governor over ACST administrative and budgetary matters. Generally, executive agencies depend on their own resources for policy and program research and information, and are unlikely to look to the council as a significant source of information and analysis (except, of course, when ACST-sponsored studies or recommendations may be used to reinforce departmental or administration positions). The Department of Fish and Game's response to the council's legislation suggests the defensive or self-protective posture that some agencies might assume if provoked by any signs of possible ACST encroachment into their research domains or possible ACST competition for state research funds. It may be significant that the council's first attempts at "direct involvement in the state budget process" in order to review agency research expenditures were aborted, ostensibly due to the impracticability of its requests for information through the governor's budget office.[7] The council is aware of state agency sensitivities, and most of its members have expressed reluctance to disturb them.[8]

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[7]ACST, "Operational and Organizational Plan," January 1979; minutes and notes, ACST meetings of February 19-20, March 22-23, 1979.

[8]Interviews with council members, February and September, 1979. The council member who is also an official of the Department of Fish and Game took the strongest position against ACST reviews or recommendations directly affecting state agency research activities.

University/Science Community

Alaska's "science community" centers on the university but it also encompasses federal and state agency professional and technical staff and members of private firms in fields such as engineering, architecture, and planning. University members of this loose community of interest probably would gain most from the establishment and funding of strong science academy and foundation institutions in Alaska, and they have played lead roles in promoting such institutions. While they undoubtedly share a broader interest in raising the status, quality, and effectiveness of professional science and engineering enterprises in Alaska, university scientists are directly dependent on government research funds to support their work, and they would likely assume lead roles in new science institutions.

Differences within the university/science community may check and constrain the institution-building process through ACST, however. Among these differences are familiar divisions between researchers variously oriented toward more basic or more applied pursuits. The latter group also includes some who are attracted to controversial political issues, which may alienate other scientists and risk political reprisals in the legislature and other political arenas. University-based researchers may further divide between those who expect to benefit from ACST research money, or who favor an alternative research funding structure, and those who see ACST in undesirable competition with the university for research dollars and control of research programs. It will, in any case, be a

major challenge to ACST to rationalize and reconcile policymakers' and scientists' widely varying perceptions of (1) the nature, purposes, and values of different types of research, (2) appropriate research structures and processes, and (3) how all of this relates--or ought to relate--to state policy issues and decisions.

Resource Development Interests

Representative Gardiner's emphasis on "resource related" studies reflects a broader legislative interest in improving information bases for state investment programs and expenditure decisions in such areas as aquaculture, bottomfisheries, agriculture, and petroleum and non-petroleum minerals. The problem for ACST is to find ways of responding to such interests without itself appearing as an advocate in a political controversy, and with the timing and forms of information that match up with legislative (or executive) decisionmaking needs in either the short term or the long term. Is the council to provide "pre-digested, simple" answers, or broader and more complex "framework" studies identifying knowns and unknowns and establishing agendas for further research, or what? Obviously, much will depend on the definition and timing of the issue, forms of requests, identities of legislative or executive sponsors and other participants, and many similar factors.

Private economic interests in various resource development sectors may view the council as a potential instrument for reflecting and reinforcing their concerns and needs before government and the public. The

problem for ACST will be to draw on the information and experience that industry representatives (and their advocates in government and academia) can provide, without losing control and being co-opted by advocates and special interests.

The above presumes that ACST itself will not become in fact or perception either (1) a captive or instrument of the research or science community--in effect, a vehicle primarily for channeling increased state funds to university researchers, private consultants, and other members of an ACST constituency--or (2) irrelevant, neglected, or unused by any significant interest.

Structure and Activities

The council's membership structure would apparently help insure against such outcomes: it is composed of two members from state executive departments "having significant research activities," two from the "academic community," two from the "general public," and one from the "staff of the legislature."[9] From one point of view, this provides a "balanced" structure, in which government members bring concern for policy relevance and effective communication with decisionmakers, and university and public members bring research standards and expertise and concern for broad public interests. From another point of view, the membership requirements build in different and conflicting values, interests, perceptions, and agendas. Executive members may variously promote and defend

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[9] Alaska Statutes 44.19.181.

their departmental interests, the legislative member may respond principally to the exigencies of legislative politics, the academic members might promote expansion of the research enterprise, and the public members may variously take sides or establish independent positions.

The first year activities of the council suggest that it is moving in a direction initially responsive to the "science community," though it has also sought to maintain a positive connection particularly with legislative leaders. The council has concentrated on institution-building rather than on substantive policy research tasks--which are scheduled to come later. It has begun establishing a science "academy" network, including committees of experts, and it has made its first bids for establishment of a well-funded science foundation. If successfully pursued during the next few years, these efforts could result in creation of an important new research institution in Alaska, but it is not yet clear what or whose interests and needs will primarily be served.

V. CONCLUSION

Having first met in December, 1978, the Alaska Council on Science and Technology has been in existence for only a short time. But review of its background and brief history suggests several points that may be of continuing significance:

1. Unlike the national SSET program, Alaska's council has concentrated on longer term institution-building and means of determining a broad range of policy research needs and priorities rather than on smaller-scale, immediate tasks involved in providing technical information to state executives and legislators. The prospective ACST structure would include a network of scientists and experts in several disciplines/issue-areas and it would control substantial funds to support research projects and related activities. The network and the funding program are inspired by the National Academy of Sciences and the National Science Foundation models, and the council itself would be a state analogue of the National Research Council or the National Science Board.

2. The council's initial phase of development has generally reflected aspirations and plans of Alaska's university-based science community for a council-academy-foundation structure. If such a structure is ultimately established, it would likely be an effective vehicle for increasing funds available from state government for Alaska research, and it might help raise the visibility, status, and possibly the political influence of at least some elements of Alaska's disparate science community.

3. So far, however, the council has concentrated on means rather than on ends. ACST's principal efforts have been devoted to building a structure rather than to defining and specifying objectives, determining potential costs and benefits, and identifying principal clients and beneficiaries. A wide range and diversity of government, academic, and private organizational interests could be affected and could yet move the council in varying directions: toward greater or less policy relevance, toward the executive branch or the legislative branch, toward resource development interests, or simply toward consolidation of a new government-funded research enterprise that competes with or overlaps existing university and government agency programs.

4. It is possible, too, that the Alaska Council on Science and Technology could ultimately end up like some state science advisory councils and similar groups elsewhere, as--in words quoted near the beginning of this report--"defunct, moribund or vacuous." On the other hand, Alaska presents unusual opportunities that could be effectively exploited by an aggressive science council: many complex social, economic and environmental issues that can be defined, in part, as critical research problems, and unprecedented amounts of petroleum revenues available to state government to spend in many sound, uncertain, and dubious ways.

APPENDIX

Alaska Council on Science and Technology

Sec. 44.19.181. Council established. (a) There is established in the Office of the Governor the Alaska Council on Science and Technology. The council consists of seven members who are appointed by the governor upon the recommendations of the state's scientific, engineering, and related communities and organizations. Appointees to the council shall be confirmed by a majority of the legislature. Members have overlapping three-year terms, except that, of the first members, two have terms of one year, two have terms of two years, and three have terms of three years. Two members shall be selected from different executive departments of state government having significant research activities, two members shall be selected from the Alaska academic community, two members shall have significant activities or direct interests in research and shall be selected from the general public, and one member shall be selected from the staff of the legislature. The council shall elect one of its members as chairman. A chairman may be elected for successive terms as chairman and serves until his successor is designated. Four members constitute a quorum. (b) Council members receive no compensation but are entitled to the travel and per diem provided by law for members of boards or commissions. (§ 2 ch 101 SLA 1978)

Sec. 44.19.182. Purpose, powers, and duties. (a) The purpose of the council is to review and recommend the scientific and technological research needs of state government, to issue research grants and contracts, to oversee the issued grants and contracts, to promote high standards of research for the priorities proposed by the council, and to address stated legislative or administrative requests for research.

(b) The council may

(1) apprise itself of local, state, federal and private research programs, activities, and needs;

(2) convene committees, task forces, conferences, public hearings, and other meetings necessary to carry out the council's purposes;

(3) award research grants and contracts on a fair and competitive basis and administer those grants and contracts;

(4) enter into agreements creating one or more systems of information exchange with any appropriate research funding sources;

(5) at the request of any state agency, enter into and administer, but not perform, the research under research grants and contracts funded by that state agency;

(6) investigate the need for and when necessary establish advisory committees for reviewing its program;

(7) request and receive from any agency of the state government the assistance and data needed to carry out the requirements of this section;

(8) hire an executive director and staff that may be necessary to implement §§ 181-189 of this chapter.

(c) The council shall

(1) develop methods of surveying research needs of the state, based on the present and future information needs of policy makers, state agencies, and the public at large;

(2) annually review the research needs and propose priorities for funding;

(3) annually submit to the governor and the legislature the findings of the council, including a listing, description, ranking, and justification of research needs, and a commentary on significant research activities of the preceding year funded by the state and including the relationship of such research to the state's needs and priorities;

(4) promote and enhance standards for research activities for which the council has administrative oversight;

(5) establish review procedures for research proposals;

(6) at the request of either the governor or the legislature, advise in a timely fashion on inquiries concerning scientific investigation or comment;

(7) evaluate and forward to appropriate agencies and persons products of research activities funded by the council; the council shall prepare comments to accompany research reports summarizing the applications, importance, or further research needs demonstrated by the findings of council-supported research;

(8) coordinate its data and information needs with other research organizations in order to avoid unnecessary duplication;

(9) not conduct any research itself other than that necessary to further the purpose of the council as provided in (a) of this section;

(10) supply to any person or agency requesting assistance the available information on past or present research activities for which the council has information which may endanger the acceptance of any research proposal which is at the time competing with other proposals for funding.

(d) [Terminates June 30, 1984]. The council may, as funds are appropriated, make grants of financial assistance of up to $5,000 to persons engaged in the development or implementation of northern technology. An application for a grant under this subsection shall be submitted to the council which shall determine the manner in which applications are reviewed and approved. The council may make grants in coordination with other sources of funding. An applicant for funds for a demonstration project shall include with his application a statement that the completed project will be available for public inspection. Any patents or royalties accruing from projects funded through grants made by the council shall remain the property of the individual receiving the grant. (§ ch 101 SLA 1978; am § 3 ch 56 SLA 1979)

Sec. 44.19.184. Records, reports. (a) The council shall have its financial records audited by an independent certified public accountant. The internal auditor and legislative auditor shall jointly prescribe the form and content of the financial records of the council and shall be afforded access to these records at any time.

(b) Before January 15 of each year, the council shall submit to the governor and the legislature a comprehensive report describing operations and expenditures and the status of grants and contracts for the last preceding fiscal year.

(c) The provisions of AS 09.25.110-09.25.120 apply to the council. (§ 2 ch 101 SLA 1978)

Sec. 44.19.188. Definitions In AS 44.19.181 - 44.19.189,

(1) "council" means the Alaska Council on Science and Technology established in AS 44.19.181;

(2) "northern technology" means the application in Alaska of methods of energy generation, waste disposal, recycling, food production, transportation, building design, and industrial enterprise which may be more efficient, and less costly and less energy intensive than those methods presently utilized and which are appropriate to the Alaska environment. (§ 2 ch 101 SLA 1978; am § 4 ch 56 SLA 1979)

Sec. 44.19.189. Short title. Sections 181-189 of this chapter may be cited as the Science and Technology Act. (§ 2 ch 101 SLA 1978)

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