



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

HRD-77-54  
3-15-77

B-133183

The Honorable Olin E. Teague  
Chairman, Committee on Science  
and Technology  
House of Representatives



Dear Mr. Chairman:

Pursuant to your request of September 15, 1976, and subsequent agreements with your office, we determined the National Science Foundation's progress in implementing the recommendations made in our report entitled "Opportunities For Improved Management of the Research Applied to National Needs (RANN) Program," November 5, 1975, MWD-75-84. As agreed, the scope of our work was limited to discussions with Foundation officials and examining documentation to support the agency's actions. As directed by your office, we did not obtain the views of Foundation officials on any of our observations. The agency's actions as of November 1976 are summarized below and discussed in more detail in the enclosure. 95

In March 1971 the Foundation consolidated most of its problem-oriented research into a single program called the Research Applied to National Needs program. The program focused on (1) the Foundation's research activities on selected environmental and social problems and (2) opportunities for future technological development to help solve major national problems.

Our 1975 report identified the following four areas in the management of the program as needing improvement

- program development,
- proposal evaluation,
- utilization planning, and
- hiring management officials.

It appears that, for the most part, the actions are largely responsive to the substance of the recommendations of our prior report on the program, although we did not test the effectiveness of the actions.

HRD-77-54

### PROGRAM DEVELOPMENT

Our 1975 report showed that the program did not have formal procedures for identifying broad problem areas for research or developing specific program objectives within problem areas. We concluded from a detailed review of the program's development of research on land use and revenue sharing that major groups outside of the Foundation either were not involved in identifying research priorities or were not as involved as they desired in developing the two program areas. We recommended that the Foundation's Director require that formal procedures be established for developing the program's research areas which would widely publicize its interest in developing the areas and involve interested organizations during initial program development stages and in finalizing objectives and plans.

Program officials have been somewhat responsive to our recommendation. Several mechanisms, such as committees, conferences, and seminars, have been established to communicate with interested parties. However, formal procedures have not been developed to make certain that these mechanisms are used to involve interested parties in developing new programs, that inputs from these parties are effectively used in program planning, and that interested parties are given continued opportunities to provide additional inputs during program development. We believe that without formal procedures it is possible for the same problems to continue that were discussed in our 1975 report.

### PROPOSAL EVALUATION

We did not evaluate the program's proposal review process in our prior effort but we did obtain the views of about 900 researchers who had submitted formal proposals to the program. The respondents were generally satisfied with some parts of the proposal review process, such as program managers' responsiveness to their informal inquiries. However, the researchers expressed concern with the peer reviewers' objectivity, the availability of peer review information, and the time required by the program to process proposals. Our 1975 report noted that many of the respondents' suggestions might affect the way proposals are evaluated throughout the Foundation. We recommended that the Foundation's Director require a study to assess the potential impact of the researchers' suggestions.

Two studies of the Foundation's peer review process are currently being performed. The National Science Board and the Subcommittee on Science, Research, and Technology, House Committee on Science and Technology, are jointly obtaining the attitudes and opinions of the scientific community toward the peer review process. This study is scheduled to be completed in early 1977. The National Academy of Science is analyzing the Foundation's proposal evaluation process. This study, which is divided into two phases, is scheduled for completion by August 1977.

The National Science Board and the Foundation's Director have issued some new policies and procedures which relate to the views of respondents to our questionnaire. These changes concern the selection of peer reviewers, release of review information, and timely processing of proposals. We did not evaluate the effectiveness of these changes.

#### UTILIZATION PLANNING

Our 1975 report showed that program management had placed increased emphasis on planning for use of research results. In May 1974, guidelines for preparing unsolicited research proposals were revised to provide more explicit direction to researchers in planning research utilization. The early guidelines (September 1971) essentially provided only a policy statement. We found that under the old guidelines, utilization planning was not thorough and that emphasis on utilization planning increased with the 1974 guidelines, but further improvements were needed. We also found that the program had no utilization planning requirements for researchers submitting proposals in response to solicitations. The solicitations have more specific objectives than general literature under which unsolicited proposals are submitted, and the proposals are in direct competition for funding.

We recommended that the Foundation's Director require that:

- The information suggested by the May 1974 utilization planning guidelines for unsolicited proposals be made mandatory and emphasis be added to the guidelines providing for early identification and active involvement of initial and secondary users.
- Utilization planning requirements be developed for proposals submitted in response to program solicitations.

--Ongoing unsolicited and solicited research projects' utilization plans be reviewed against the May 1974 guidelines and the recommended requirements for solicited proposals, respectively, to determine if the plans need modification.

--Utilization plans in research proposals be a distinct, separate part.

Program management has been generally responsive to our recommendations by requiring research proposals to contain a utilization plan. However, they did not require each utilization plan to contain the information suggested by the utilization planning guidelines as we had recommended. Program management is currently updating the guidelines and plans to contain our suggestions that researchers include in their utilization plan (1) user group identification, user demand description, utilization process description, and a utilization budget, or a justification for the omission of these elements and (2) a statement explaining the roles and inputs of users who participated in defining the problem and the involvement of initial and secondary users during the research.

Program officials advised us that, with the exception of a few projects, utilization plans for projects active at the time of our previous review have been reviewed and modified. We did not determine the adequacy of the revisions made to the utilization plans. Also, we did not determine the degree of information in the utilization plans for projects resulting from unsolicited or solicited proposals funded since our prior review.

#### HIRING MANAGEMENT OFFICIALS

Under a provision of the National Science Foundation Act of 1950, as amended, 42 U.S.C. 1873 (1970), the Foundation's Director has authority to employ technical and professional personnel without complying with the competitive hiring provisions of title 5 U.S. Code. We previously determined that as of June 1974, 87 percent of the program's professionals were hired by using the excepted authority. Although the program had obtained a highly qualified staff, we noted that it was not considering the available qualified professionals from the Civil Service Commission's registers before using the excepted hiring authority. We recommended that the Foundation's Director, when seeking staff, determine the availability of personnel from the registers.

The Foundation's Director advised us, in a February 1976 letter, that a documented search would be made through the Commission's registers for qualified personnel to fill the program's positions. A program official said that 12 professionals were hired for the program during the 12-month period after our 1975 report was issued. Six professionals received competitive appointments, and the other six received excepted appointments. The Foundation considered candidates from the Commission's registers for 4 of these 12 positions. One professional that received a competitive appointment came from the Commission's register. In the other three cases, the Foundation concluded that none of the candidates met its qualifications.

According to a Foundation official, the Commission's registers are not reviewed in all cases because the Foundation believes that highly qualified personnel are not often available from that source. Furthermore, we were informed that the Foundation's personnel office is unable to review the Commission's registers in all cases due to other workload requirements.

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This report contains no recommendations. Since the report discusses the agency's actions to implement the recommendations of our 1975 report, we believe it should be available to the Foundation's Director. As previously agreed with your office, we will be in touch with you in the near future to arrange for the release of the report.

Sincerely yours,

  
DEPUTY Comptroller General  
of the United States

Enclosure

NATIONAL SCIENCE FOUNDATION ACTIONS ON  
RECOMMENDATIONS OF GAO REPORT "OPPORTUNITIES FOR  
IMPROVED MANAGEMENT OF THE RESEARCH APPLIED TO NATIONAL  
NEEDS (RANN) PROGRAM," NOVEMBER 5, 1975, MWD-75-84

INTRODUCTION

Pursuant to a September 15, 1976, request of the Chairman, House Committee on Science and Technology, and subsequent agreements with his office, we determined the National Science Foundation's progress in implementing the recommendations made in our 1975 report on the Research Applied to National Needs (RANN) program. As agreed, the scope of our work was limited to discussions with Foundation officials and examining documentation to support the agency's actions.

In March 1971 the National Science Foundation consolidated most of its problem-oriented research into a single program. This program, known as RANN, focused on (1) the Foundation's research activities on selected environmental and social problems and (2) opportunities for future technological development to help solve major national problems.

The general objectives of the program are to

- increase the effective use of science and technology in dealing with national problems involving the public interest,
- shorten the leadtime between basic scientific discoveries and relevant practical applications, and
- provide early warning of potential national problems and initiate assessments and research useful in avoiding or solving such problems.

During fiscal years 1971-76, the program's obligations totaled \$390 million.

Our 1975 report considered RANN's policies, procedures, and practices for developing research programs, evaluating research proposals, planning for use of research results, and hiring management officials. The following summarizes the report's conclusions and recommendations and gives the status of the Foundation's progress as of November 1976 in implementing the recommendations.

PROGRAM DEVELOPMENT

Our 1975 report showed that RANN did not have formal procedures for identifying broad problem areas for research or developing specific research programs for problem areas. At that time, the development of new research programs had resulted primarily from recommendations made by the Committee on Public Engineering Policy (a part of the National Academy of Engineering), the interest and experience of RANN staff, and unsolicited research proposals received by RANN.

We traced the specific development of two of RANN's research programs--land use and revenue sharing. The following four stages of development were common to the two programs

- beginning program ideas,
- developing program plans,
- assigning priorities, and
- selecting and funding individual projects.

Our review showed that major groups outside of the Foundation either were not given an opportunity to express their views or were not as involved as they desired in the programs' developmental process. In developing RANN's land use research program, the views of a number of interested parties from Federal agencies, State and local governments, and private industry were not obtained. In planning the revenue-sharing research program, interested groups representing State governments and the poor and minority citizens were not involved.

We concluded that opportunities for people with a wide range of interests to participate in developing research programs must exist if research, most responsive to national needs, is to be supported. We recommended that the Foundation's Director require that formal procedures be established for developing RANN's research programs which would widely publicize its interest in developing a program area. The procedures should also provide communication mechanisms with interested persons, organizations, and Federal agencies having related programs to obtain their views during initial program development stages and in finalizing program objectives and plans.

Agency actions

In a February 1976 letter to us the Foundation's Director agreed with our recommendation and stated that RANN had established formalized mechanisms to provide broad input to its program planning process on a continuing basis. Management has been somewhat responsive to our recommendation by establishing committees, conferences, and seminars to facilitate communication with interested parties. However, it has not developed formal procedures to make certain that these mechanisms are used to involve interested parties in developing new programs, that inputs from these parties are effectively used in program planning, and that interested parties are given continued opportunities to provide additional inputs during program development. We believe that without formal procedures it is possible for the same problems to continue that were discussed in our 1975 report.

The discussion which follows identifies some of the mechanisms that the Foundation relies on for obtaining inputs from interested persons, organizations, and Federal agencies during program development and in finalizing program objectives and plans. These mechanisms are the Advisory Committee for Research Application Policy, interagency coordinating committees, conferences and seminars, the Urban Consortium, and the Urban Technology System.

Advisory Committee on  
Research Application Policy

This committee was established in September 1972 with the purpose of providing advice and counsel on goals and policies pertaining to RANN's programs. The committee consists of not more than 20 persons from the academic, industrial, and user communities. As of November 1976, members included individuals such as the Vice President for Research of the Massachusetts Institute of Technology, Vice President for Research of the General Electric Company, and the President of the American Association for the Advancement of Science.

This committee had never convened before our 1975 report; its first meeting occurred in November 1975. RANN officials said that this committee has been meeting every 6 months to advise them on major goals and policies pertaining to research-applications activities and programs. Minutes from the November 18-19, 1975, meeting presented recommendations on each of the following major program elements:



- Environment: strengthen research on the estimate of damages caused by pollution.
- Energy/Resources: research be emphasized on photosynthetic research and the long-term enhancement of domestic food production.
- Productivity: satisfy the public-good criterion in all cases involving funding of private sector research projects.
- Technology Assessment: refinements be made to the conceptualization of this program.
- Intergovernmental Science and Public Technology: strengthen couplings between the industrial and intergovernmental programs.

A RANN official said that great importance was attached to the committee's major recommendations. We did not determine if these recommendations actually affected the program's development. Minutes of the May and November 1976 meetings had not been finalized and were not available for our review.

#### Interagency coordinating committees

As of December 1976, RANN sponsored six interagency coordinating committees, which consisted of a parent committee and five subcommittees or panels corresponding with each of its five program divisions (environment, resources, productivity, technology assessment, and intergovernmental programs). Members of the parent committee include the Foundation's assistant director for research applications (chairman) and representatives from 21 Federal agencies and departments involved in research activities. Typical representatives are assistant secretaries or the equivalent from such agencies as the Department of Agriculture; Department of Health, Education, and Welfare; and the Department of Transportation. The interagency panels, chaired by various RANN division directors, provide for an interagency review of specific RANN programs and coordination of planned research efforts. Panel members include division directors or assistant directors from other Federal agencies with similar interests. The parent committee's and panels' basic functions apparently are to inform other agencies of RANN's overall research plan for the coming fiscal year, to identify any overlap with other agencies' programs which might require modifications to RANN programs, and to lay the groundwork for future coordination of research projects.

These coordinating committees existed at the time of our earlier review. However, they met infrequently and provided little input to RANN's programs. A RANN official said that the parent committee and panels are now generally meeting twice a year to discuss its programs for the upcoming year. The committees' current functions appear to be similar to those discussed in our 1975 report. We did not determine the current effectiveness of the operations of these committees.

#### Conferences and seminars

In fiscal year 1975, RANN supported some 146 seminars, workshops, and conferences in specific program areas to exchange technical information and to receive input from the scientific and user communities to assist in program development. In 1976, RANN sponsored five conferences to identify and evaluate various research issues related to the area of environmental design. Based on these conferences, a report was issued proposing a possible framework for organizing and evaluating the broad range of issues with general examples of research projects needed in the environmental design area.

A RANN official also cited their 11 regional seminars, the small business conference, and the RANN symposium as input to program development. The regional seminars were held in major cities, such as Atlanta, New York, Boston, and Los Angeles. The primary objectives of these seminars were to describe the RANN program to interested persons and organizations and to increase their possible participation in the program. The seminars attracted 4,000 participants and were sponsored by academic institutions in each region.

The small business conference was held in Washington, D.C., in January 1976 to help strengthen small businesses' participation in the RANN program. More than 400 small business representatives and representatives from Federal agencies participated in the 2-day meeting. Preliminary meetings with the leaders from major small business associations, the Small Business Administration, and representatives of 13 Federal agencies with large research budgets also were held to obtain their views on problems and needs of small businesses and to establish the meeting's agenda.

The RANN 2-day symposium was held in Washington, D.C., in November 1976 and was to provide government, industry, university leaders, and the interested public the opportunity to exchange ideas. Topics discussed at the symposium included

municipal waste as a resource, regulation of financial institutions, nonconventional sources of protein, and private sector productivity improvement.

Urban Consortium and the Urban Technology System research projects

The consortium consists of representatives from 34 cities with populations over 500,000. The consortium focuses its efforts on urban problems and makes recommendations to RANN involving the development or application of technology to solve these problems. The urban technology system is a network of 27 cities with populations from 50,000 to 500,000. The system has assigned engineers and scientists called "Technology Agents" to 27 local governments and provided them with technical support from major research and development organizations. The agents work directly with their respective local governments and are exploring solutions to a wide range of local problems.

We did not determine the extent that these groups have participated in program development. These networks were funded by RANN before our 1975 report. However, RANN officials said that emphasis has since been given to these projects as an aid in RANN's program development process. Both mechanisms are designed to address problems that can be solved with existing technology and to encourage additional research for developing technologies specifically required by their respective participating jurisdictions. RANN officials advised us that needs identified by these two groups are considered by RANN management in developing programs.

PROPOSAL EVALUATION

RANN research proposals are generally classified as either unsolicited or solicited. Unsolicited proposals, the most frequently used to grant RANN awards, are usually submitted at the researcher's initiative in response to general RANN literature or personal contact with officials. Solicited proposals, in contrast, are proposals submitted in response to solicitations that provide for more definitive objectives and require researchers to submit proposals within a more limited time frame.

RANN's procedures for evaluating research proposals differ depending on whether the proposals are unsolicited or solicited. Researchers can submit unsolicited proposals in

either preliminary or formal form. RANN's evaluation of preliminary proposals or its early evaluation of a formal proposal, determines whether proposals are consistent with RANN program objectives and have sufficient scientific merit to be funded. The RANN program manager evaluates each proposal by using his own judgment and reviews requested from other scientists and Federal officials. The program manager's recommendation for award or declination is reviewed by a RANN grant review board which consists of RANN's Deputy Assistant Director, representatives of other RANN offices, and Foundation legal and administrative representatives. The recommendation is acted on by appropriate RANN and Foundation officials.

Unsolicited proposals are generally evaluated on their own merits, instead of being compared to other proposals in the same research area. In contrast, solicited proposals are evaluated against other proposals received in response to a solicitation. A proposal evaluation panel which may consist of Foundation officials, peer reviewers, or others chosen by the program manager initially determines which proposals are within a competitive range by considering such factors as the performers' capability and whether the requirements of the solicitation have been met. The panel then ranks the competitive proposals according to cost and submits the proposals to the program manager. The program manager selects several proposals for awards from this ranking and forwards the recommended awards to responsible RANN and other Foundation officials.

We did not evaluate the RANN proposal review process in our 1975 report, but we did obtain the views of about 900 researchers who had submitted formal research proposals to the RANN program. Approximately one half of their proposals had been funded by RANN. The researchers were generally satisfied with several facets of RANN's proposal review process. For example, researchers indicated that RANN program managers were responsive to their informal inquiries which could help the researchers to prepare better formal proposals at a lower cost. Also, approximately 85 percent of the researchers who had also served as peer reviewers felt RANN provided adequate instruction and guidance to peer reviewers. However, the researchers responding to our questionnaire generally expressed concern with the peer reviewers' objectivity, the availability of peer review information, and the time required by RANN to process proposals. Specific areas of change suggested by the researchers included:

- New controls to provide for objectivity in selecting RANN's peer reviewers.
- Establish a systematic method for evaluating quality of peer reviews.
- Allow researchers to receive specific reviewers' comments on proposals and a copy of reviewers' comments upon request.
- Procedures to provide researchers with more explicit reasons for proposals not being funded.
- Improvements in the time required by RANN to process proposals.

Our 1975 report noted that many of the researchers' suggestions might also affect the way proposals are evaluated throughout the Foundation. We recommended that the Foundation's Director require a study to assess the potential effects of these changes to RANN's research proposal evaluation system.

#### Agency actions

Two studies of the Foundation's peer review process are currently underway. The National Science Board and the Subcommittee on Science, Research, and Technology, House Committee on Science and Technology, are jointly obtaining the attitudes and opinions of the scientific community toward the peer review process. This study is scheduled for completion in early 1977. The National Academy of Science is analyzing the Foundation's proposal evaluation process. This study is scheduled for completion by August 1977. The National Science Board and the Foundation's Director have also issued some new peer review policies and procedures concerning the views of respondents to our questionnaire. The following discusses four areas of change suggested by respondents and information about ongoing studies of the peer review system. We did not evaluate the effectiveness of these changes.

#### Objective selection of reviewers and quality of their comments

RANN program managers generally use their professional judgment in selecting peers to review research proposals. However, only about 6 percent of the researchers responding to our questionnaire favored RANN program managers selecting

peer reviewers based solely on the program manager's professional judgment. Responses to the questionnaire indicated that researchers preferred that peer reviewers be selected by methods which provided some degree of objectivity.

We also asked researchers to identify how RANN could best insure the quality of peer reviews. Respondents generally indicated that they preferred an established, systematic method for evaluating reviewers' performance rather than relying on the RANN program manager's judgment. Researchers indicated they preferred either a periodic analysis of each reviewer's performance, a requirement that researchers evaluate each other's comments, or that reviewers be compensated for time spent reviewing proposals.

On February 13, 1976, the Foundation's Director issued Foundation-wide general guidelines for selecting peer reviewers by program managers. The guidelines state that, to the extent possible, the reviewers for any single proposal should reflect a balance of type of institutions, geographical location, minority interests, and other factors relevant to the proposal. The guidelines also state that, to provide balance among differing points of view, the program manager should consider the scientific and personal biases of potential reviewers, while being alert to biases in the reviews received.

A RANN official informed us that its grant review board considers the objectivity of peer reviewers selected by a program manager while reviewing recommended awards and declinations, as was the practice during our prior review. In addition, the official said a board member is now required to review copies of peer review comments. Other board members continue to review a summary of the comments. Also, the board members can require a program manager to obtain additional peer reviews on a proposal, if the board determines the reviews submitted to them are not sufficient to justify an award or declination.

The Foundation has also developed an automated information system which can list all peer reviewers used. The system provides the Foundation with the capability of analyzing trends in the types of institutions and geographical location of reviewers, but cannot identify the scientific philosophy or any personal biases of reviewers.

Foundation policy concerning release  
of peer review comments

At the time of our survey, Foundation policy for releasing peer review information was to provide the researcher with a summary of peer review comments received on his proposal. Nearly 100 percent of the researchers responding to our questionnaire believed that, on request, they should be given the individual reviewer's comments. About 40 percent of the respondents indicated that they preferred a copy of each reviewer's comments. The others indicated that they preferred either an edited text, a specific description, or a summary of each reviewer's comments.

On June 30, 1975, the Foundation's Director announced that after January 1, 1976, principal investigators and project directors would be given, upon request, copies of anonymous peer review comments on their research proposals. The Foundation issued a letter to the presidents of universities, colleges, and other grantee organizations notifying them of this new policy.

RANN officials were not able to provide us with comprehensive statistics identifying the number of requests for peer review comments during the last year. However, they were able to identify the number of requests received by two of RANN's five offices. Between November 1975 and October 1976, the Advanced Energy and Resources Research and Technology Division and the Exploratory Research and System Analysis Division received approximately 50 requests for peer review comments on proposals which were declined. RANN officials said that these requests covered approximately 15 percent of the proposals declined funding by these two offices during a 12-month period.

Procedures to provide researchers with  
more explicit reasons for declination

The respondents expressed concern about RANN officials not providing detailed information to them to explain the reasons for not funding their proposal. Approximately 70 percent of the researchers, who had at least one proposal declined, indicated that they had received only a general statement or summary analysis giving the reasons for the declination. The remaining 30 percent of the researchers, who had been denied an award, had received specific comments about the proposal to explain the declination. Over 60 percent of the researchers believed that the criticisms given by RANN officials did not provide a reasonable basis for the declination, and another

14 percent expressed some dissatisfaction with the reason given.

A February 26, 1976, Foundation-wide memorandum from the Foundation's Director stated that information provided to principal investigators concerning a Foundation decision shall be as explicit as possible. However, RANN's standard declination letter, sent to all researchers whose proposals are declined, does not give the researcher the specific reasons for the refusal. The letter states that information about the proposal review is available upon request from the program manager.

Statistics developed by RANN indicated that few researchers have requested formal explanations for project declinations. RANN officials, however, believed that most principal investigators were aware of the reasons for proposal declinations through informal contact with program managers and, therefore, did not require a formal explanation.

As previously stated, the respondents to our questionnaire were not satisfied with the reasons given to them by RANN for a declination. Although the Foundation has formally announced its policy to provide reasons for a declination upon request, we believe researchers might be reluctant to request that information for fear that this might adversely affect the Foundation considering future proposals. Providing researchers with specific reasons for a declination, possibly through the declination letter, might help improve the quality of the researcher's future proposals, or the quality of the same proposal if it is submitted to another agency after the proposal has been reworked. We believe that RANN should make every effort to inform the researcher of the specific reasons for the declination.

#### Improved processing time for proposals

The respondents to our questionnaire said that the time used by RANN to process a proposal was important for planning their work. As discussed in our 1975 report, the time required by RANN to process all formal proposals received between July 1, 1971, and March 5, 1974, showed that approximately 25 percent of all proposals required more than 6 months. However, only about 5 percent of the researchers indicated that they could wait longer than 6 months for RANN's decision on their proposal.



In November 1975 the Foundation's Deputy Director issued a memorandum to all offices imposing a 9-month limit on the time allowed each directorate <sup>1/</sup> for processing a proposal and requiring the directorate's assistant director to approve all proposals which exceed this limit. RANN management has improved its processing time in an effort to comply with this limitation. As of November 1, 1975, RANN had approximately 160 preliminary and 459 formal proposals pending more than 6 months. Twelve months later, RANN had only 10 preliminary and 38 formal proposals pending more than 6 months. RANN officials said that a reduction in the number of formal proposals received by RANN might be another factor which contributed to its improved processing time. For example, RANN officials estimated that they received approximately 35 percent fewer proposals during fiscal year 1976 than the previous year. Almost half of this reduction was due to transferring energy-related research from RANN to the Energy Research and Development Administration.

#### Ongoing studies of the peer review process

A study jointly commissioned by the National Science Board and the Subcommittee on Science, Research, and Technology, House Committee on Science and Technology, has been obtaining the attitudes and opinions of the scientific community toward the Foundation's peer review process. Two questionnaire surveys were performed. One survey sampled reviewers selected from all individuals who reviewed Foundation proposals that were acted upon in fiscal year 1974, and the other sampled applicants for Foundation research funds selected from proposals that were awarded, declined, or withdrawn in fiscal year 1975. The questionnaires asked the researchers for their views of the peer review procedures and their attitudes towards various modifications in the review process. The surveys were initiated in late 1975, and the results are expected to be published in early 1977.

The Foundation has also awarded a contract to the National Academy of Sciences to analyze its peer review process. The Academy's study divided the research into two phases. Phase one is to primarily provide a detailed description of the Foundation's peer review system. According to a Foundation official, a draft report of phase one was in process as of January 1977. Phase two is to examine

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<sup>1/</sup>The Foundation has six major organization units (called directorates) to carry out its research activities.

several issues relating to the use of external peer reviews in the evaluation process, including the impact of the selection process for reviewers and the amount of information provided to the reviewers at the time of the review. Also, it will examine funding patterns and determine the effectiveness of the selection process in supporting basic science. A report on phase two is to be completed by August 1977.

#### UTILIZATION PLANNING

Our 1975 report discussed RANN management's planning for use of research it supported. It showed that in September 1971 RANN developed utilization planning guidelines applicable to unsolicited proposals entitled "Interim Description and Guidelines for Proposal Preparation." The guidelines essentially provided a policy statement for RANN officials and researchers in planning for utilization. The guidelines stated:

"\* \* \* It is particularly important to identify the potential beneficiaries or users of the anticipated research results and to plan for effective information transfer to them. It is essential in this connection that the beneficiaries or users be involved in the planning and/or implementation of the research in all appropriate and practical ways. Moreover, in addition to publication through normal scientific channels, proposals should indicate possibilities for communicating with a larger, non-scientific, audience."

We reviewed six research projects which, for the most part, were initially funded and renewed under RANN's 1971 interim guidelines for unsolicited proposals and found that utilization planning was generally not thorough. Potential users that would be involved in establishing the feasibility of using the research results were not always identified in the projects' early stages, and user involvement for planning broader application of the research results generally did not exist. Also, there appeared to be very little initial planning to identify potential barriers to implementation. In addition, elements of utilization planning were often scattered throughout the proposals which made it difficult to determine the scope of planned utilization activities.

These guidelines were revised in draft form in November 1973 and reissued in May 1974 to provide more explicit direction to researchers in planning research utilization. For example, the section on dissemination and promotion of

research results was expanded to include more specific guidance within the overall philosophy of encouraging user involvement and disseminating research results.

Our review of four projects funded under RANN's revised May 1974 guidelines for unsolicited proposals showed that emphasis on utilization planning seemed to be improving. However, only one of the projects met the revised elements of utilization planning. In addition, one project did not contain a utilization plan.

Our review also showed that utilization planning requirements had not been established for research proposals submitted in response to program solicitations. An examination of 10 solicitations showed inconsistent and sometimes inadequate emphasis on utilization planning.

Data obtained from a questionnaire which we sent to 150 users of RANN research, as identified by RANN officials, showed little user involvement in the research project processes, which indicated that improvements might be needed in many of RANN's ongoing research projects.

We recommended that the Foundation's Director require that:

- The information suggested by the May 1974 utilization planning guidelines for unsolicited proposals be made mandatory and emphasis be added to the guidelines providing for early identification and active involvement of initial and secondary users.
- Utilization planning requirements be developed for proposals submitted in response to program solicitations.
- Ongoing unsolicited and solicited research projects' utilization plans be reviewed against the May 1974 guidelines and the recommended requirements for solicited proposals, respectively, to determine if the plans need modification.
- Utilization plans in research proposals be a distinct, separate part.

Agency actions

A February 1976 RANN bulletin requires unsolicited proposals to have a utilization plan which describes the necessary steps to insure research use before the proposal will be funded. However, RANN management does not require each utilization plan to contain the information suggested by its May 1974 guidelines as we had recommended. The guidelines were reissued in May 1975 and are similar to the 1974 guidelines in that they state each utilization plan should generally include user group identification, user demand description, utilization process description, and a utilization budget. RANN management allows researchers flexibility in determining the content of their utilization plans because in some projects, extensive user involvement might be premature or the use of the results might be obvious and would not require an elaborate plan.

We agree that the degree of information in a utilization plan should reflect the nature of the project and its expected use. However, the four elements appear to be basic considerations in utilization planning, and justification for omitting any element should be provided in the plan. RANN management agreed and in updating the 1975 guidelines will include our suggestions that researchers (1) include in their utilization plan user group identification, user demand description, utilization process description, and a utilization budget, or a justification for the omission of these elements and (2) a statement explaining the roles and inputs of users who participated in defining the problem and the involvement of initial and secondary users during the conduct of the research.

The February 1976 RANN bulletin also states that all program solicitations should contain instructions to researchers to include utilization plans in their solicited proposals. Since our prior RANN study, RANN management has issued three solicitations requesting research on the social effects of broadcast television, the application of scientific or technological methodology to problems of local government, and the benefits and costs of regulating selected commodities and services. Each solicitation, which attempts to achieve research that would be useful to policy makers in the public sector, includes instructions for preparing a utilization plan. Each instruction provides for identification of research users and methods for disseminating research results to them. However, two of the three solicitations did not suggest active involvement of users during the research process.

RANN management has also instructed its program divisions to compare the utilization plans in all active awards funded before May 1975 with the suggested planning information in its May 1975 guidelines for unsolicited proposals to determine if the plans need modification. According to a RANN official, as of December 22, 1976, the evaluations were complete except for a few projects. Also, the necessary modifications to utilization plans have essentially been made. The RANN grant review board was also involved in this evaluation through its consideration of ongoing projects requesting renewal. As of December 22, 1976, no summary report of the total evaluation was requested by RANN management.

RANN management's actions to foster improved use of research results are largely responsive to our recommendations. However, we did not examine utilization plans for individual research projects resulting from unsolicited or solicited proposals funded since our previous review to determine if information in the plans conforms to RANN's utilization planning guidelines. Further, we did not examine the utilization plans of projects ongoing at the time of our previous review to determine the adequacy of any modifications to the plans made by RANN officials in response to our recommendation that the plans be reviewed.

RANN has taken some additional steps to improve utilization of its research results. RANN awarded a grant to study the utilization of several RANN projects funded during fiscal years 1972 and 1973. The objectives of the study were to determine the nature and extent of utilization of those RANN projects and to assemble findings that would (1) aid RANN in responding to inquiries regarding utilization of its research and (2) guide RANN efforts to strengthen utilization activities. The study reviewed individual research projects and presented information on a case-by-case basis. However, it did not present general findings or conclusions. A RANN report, prepared by the program manager who monitored the study, discussed the case studies and concluded that few observations which might apply to other RANN projects could be drawn from the case studies.

In January 1976, to further evaluate utilization, RANN established a task force whose members were RANN personnel from each of its program divisions. The task force is responsible for reviewing RANN utilization efforts and developing a research utilization strategy and program, which exploits to the fullest those techniques which have proven most successful in RANN and elsewhere. A draft report of the task

force's activities has been provided to RANN management. Its recommendations will be reviewed, and RANN expects to make a decision on the recommendations by April 15, 1977.

On February 6, 1976, the Foundation's Director commented on our 1975 report and said that RANN now requires explicit utilization plans for each program element. The utilization plans were to relate the expected flow of products overtime to immediate and final users. Our discussions with RANN officials indicated that explicit utilization plans for each program element have not been developed. Instead, through its long-range planning effort, RANN has attempted to develop program objectives, goals, and milestones for meeting those objectives. They further explained that an explicit utilization plan for each program would develop as the program matures. We did not examine RANN's long-range plans for evidence of emphasis on utilization.

#### HIRING MANAGEMENT OFFICIALS

Under the National Science Foundation Act of 1950, as amended, 42 U.S.C. 1873 (1970), the Foundation has been granted excepted hiring authority. This provision allows the Foundation's Director to employ technical and professional personnel without complying with the competitive hiring provisions of title 5, U.S. Code.

The competitive appointments, as governed by title 5 and the Civil Service Commission's regulations, generally provide for position classification according to Government General Schedule pay schedules (such as GS-1), competitive examination, and a probationary employment period. The Foundation's Director, by exemption from these requirements, has considerable flexibility in hiring and dismissing personnel and in determining compensation.

Our November 1975 report stated that the RANN program had a highly qualified management staff. However, we determined that as of June 1974, 87 percent of the professionals in the RANN program had been hired through excepted appointments. Various RANN division and office directors said they preferred to recruit RANN professional personnel from personal referrals by other RANN officials, although other sources such as responses to job announcements, referrals from other Foundation officials, referrals from the Civil Service Commission, and walk-ins were also used. An official from the Civil Service Commission's Washington office said that the Commission had

qualified technical and professional personnel on its registers. We recommended that the Foundation's Director require that a determination be made of whether desired personnel are available from the Commission's registers before using the Foundation's excepted hiring authority.

Agency actions

In a February 1976 letter, the Foundation's Director advised us that a documented search would be made through the Commission's registers for qualified personnel to fill positions in the RANN program. A RANN official said that 12 professionals were hired for the RANN program during the 12-month period after our 1975 report was issued. Six professionals received competitive appointments and the other six received excepted appointments. The Foundation considered candidates from the Commission's registers for 4 of these 12 positions. One professional that received a competitive appointment came from the Commission's register. In the other three cases, the Foundation concluded that none of the candidates met its qualifications.

According to a Foundation official, the Commission's registers are not reviewed in all cases because the Foundation believes that highly qualified personnel are not often available from that source. Furthermore, we were informed that the Foundation's personnel office is unable to review the Commission's registers in all cases due to other workload requirements.