

National Nanotechnology Infrastructure Network (NNIN)

Program Solicitation

NSF 03-519



National Science Foundation

Directorate for Engineering

- Division of Electrical and Communications Systems
- Division of Bioengineering and Environmental Systems
- Division of Chemical and Transport Systems
- Division of Design, Manufacture, and Industrial Innovation
- Division of Civil and Mechanical Systems

Directorate for Mathematical and Physical Sciences

- Division of Materials Research
- Division of Chemistry

Directorate for Biological Sciences

- Division of Biological Infrastructure

Directorate for Computer and Information Science and Engineering

- Division of Computer-Communications Research
- Division of Experimental and Integrative Activities
- Division of Advanced Networking Infrastructure and Research

Directorate for Geosciences

- Division of Atmospheric Sciences
- Division of Earth Sciences
- Division of Ocean Sciences

Directorate for Social, Behavioral, and Economic Sciences

- Division of Social and Economic Sciences

Directorate for Education and Human Resources

- Division of Undergraduate Education

Letter of Intent Due Date(s) (required):

April 07, 2003

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

May 16, 2003

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

National Nanotechnology Infrastructure Network (NNIN)

Synopsis of Program:

The National Science Foundation announces an open competition to establish a National Nanotechnology Infrastructure Network (NNIN) as an integrated national network of user facilities that will support the future infrastructure needs for research and education in the burgeoning nanoscale science and engineering field. The facilities comprising this network will be diverse both in capabilities and research areas served as well as in geographic locations, and the network will have the flexibility to grow or reconfigure as needs arise. The NNIN will broadly support nanotechnology activities outlined in the National Nanotechnology Initiative investment strategy. It will provide users across the nation access to leading-edge fabrication and characterization tools and instruments in support of nanoscale science and engineering research, develop and maintain advanced research infrastructure, contribute to the education and training of a new workforce skilled in nanotechnology and the latest laboratory techniques, conduct outreach to the science and engineering communities, and explore the social and ethical implications of nanotechnology.

Cognizant Program Officer(s):

- Lawrence S. Goldberg, Senior Engineering Advisor, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: lgoldber@nsf.gov
- Rajinder Khosla, Program Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: rkhosla@nsf.gov
- Bruce K. Hamilton, Division Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-7066, fax: (703) 292-9098, email: bhamilto@nsf.gov
- Cyrus Aidun, Program Director, Directorate for Engineering, Division of Chemical & Transport Systems, 525 N, telephone: (703) 292-8371, fax: (703) 292-9054, email: caidun@nsf.gov
- Charalabos Doumanidis, Program Director, Directorate for Engineering, Division of Design, Manufacture, & Industrial Innovation, 531 S, telephone: (703) 292-7088, fax: (703) 292-9056, email: cdoumani@nsf.gov
- Ken P. Chong, Program Director, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: kchong@nsf.gov
- Hugh M. Van Horn, Senior Scientist/Program Director (NAF), Directorate for Math & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4920, email: hvanhorn@nsf.gov
- Lynn Schneemeyer, Program Director, Directorate for Math & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4945, fax: (703) 292-9037, email: lschneem@nsf.gov
- Gerald B. Selzer, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: gselzer@nsf.gov
- S. Kamal Abdali, Division Director (Acting), Directorate for Computer & Information Science & Engineering, Division of Computer-Communications Research, 1145 S, telephone: (703) 292-8910, fax: (703) 292-9059, email: kabdali@nsf.gov
- Darleen L. Fisher, Program Director, Directorate for Computer & Information Science & Engineering, Division of Experimental and Integrative Activities, 1160 N, telephone: (703) 292-8980, fax: (703) 292-9030, email: dlfisher@nsf.gov
- Taieb Znati, Senior Program Director, Directorate for Computer & Information Science & Engineering, Division of Advanced Networking Infrastructure and Research, 1175 N, telephone: (703) 292-8949, fax: (703) 292-9010, email: tznati@nsf.gov
- Anne-Marie Schmoltner, Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8522, fax: (703) 292-9022, email: aschmolt@nsf.gov
- David Lambert, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8558, email: dlambert@nsf.gov
- Alexandra Isern, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, email: aisern@nsf.gov
- Rachele D. Hollander, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7272, fax: (703) 292-9068, email: rholland@nsf.gov
- Duncan E. McBride, Section Head, Directorate for Education & Human Resources, Division of Undergraduate Education, 835 N, telephone: (703) 292-4630, fax: (703) 292-9015, email: dmcbride@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.074 --- Biological Sciences
- 47.070 --- Computer and Information Science and Engineering

- 47.076 --- Education and Human Resources
- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.049 --- Mathematical and Physical Sciences
- 47.078 --- Office of Polar Programs
- 47.075 --- Social, Behavioral and Economic Sciences

Eligibility Information

- **Organization Limit:**

U.S. academic institutions with strong research and education programs in nanoscale science and engineering and with appropriate fabrication and/or instrumentation facilities are eligible to submit and participate in a network proposal. Non-academic U.S. institutions and organizations, including national laboratories and private-sector companies, as well as non-U.S. institutions, may participate in network activities using their own resources.

- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** An institution may propose inclusion of the same facility capabilities in only one network proposal.

Award Information

- **Anticipated Type of Award:** Cooperative Agreement
- **Estimated Number of Awards:** 1 - national network. NSF may combine elements from more than one meritorious proposal to ensure development of a comprehensive network.
- **Anticipated Funding Amount:** \$14,000,000 to fund the network for each year of five-years duration, beginning in FY 2004, pending the availability of funds.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Letters of Intent (*required*):**
April 07, 2003
- **Full Proposal Deadline Date(s)** (due by 5 p.m proposer's local time):
May 16, 2003

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Eligibility Information**
- IV. **Award Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. Proposal Preparation Instructions
 - B. Budgetary Information
 - C. Due Dates
 - D. FastLane Requirements
- VI. **Proposal Review Information**
 - A. NSF Proposal Review Process
 - B. Review Protocol and Associated Customer Service Standard
- VII. **Award Administration Information**
 - A. Notification of the Award
 - B. Award Conditions
 - C. Reporting Requirements
- VIII. **Contacts for Additional Information**
- IX. **Other Programs of Interest**

I. INTRODUCTION

The emerging field of nanoscale science and engineering is leading to unprecedented understanding of, and control over, the basic building blocks and properties of all natural and man-made objects. Advances in nanofabrication, using top-down as well as bottom-up technologies, have afforded the ability to work at the atomic and molecular levels to create large structures with fundamentally new organization and functionality. At the same time, advances in instrumentation to analyze, measure, and manipulate structures at the nanoscale have opened entirely new areas of investigation into the fundamental properties of materials systems in diverse disciplines. Yet, because of their expense and the requisite associated expertise and supporting infrastructure, many of these sophisticated tools and instruments cannot easily be duplicated in every laboratory.

In looking toward the next decade, the NSF is announcing in this solicitation an open competition to establish a National Nanotechnology Infrastructure Network (NNIN) as an integrated national network of user facilities that will support the future infrastructure needs for research and education in the burgeoning nanoscale science and engineering field. The success of a network

of user facilities under the National Nanofabrication Users Network (initiated in 1994 and coming to the completion of NSF support at the end of 2003) has demonstrated that NSF must advance an expanded national infrastructure that is capable of providing researchers in academia, small and large industries, and government with the appropriate nano and micro fabrication and characterization tools, instruments, and capabilities to enable the broadest range of ideas for innovation and education. The NNIN goal of developing a flexible and enabling infrastructure is an important component in the investment strategy of the National Nanotechnology Initiative (NNI)⁽¹⁾ and is consistent with the recommendations in the National Research Council's recent review⁽²⁾ of the NNI.

The new competition is supported by the Directorates for Engineering; Mathematical and Physical Sciences; Biological Sciences; Computer and Information Science and Engineering; Geosciences; Social, Behavioral, and Economic Sciences; and Education and Human Resources. This program investment is part of the NSF Nanoscale Science and Engineering priority area, and complements NSF core activities and the Nanoscale Science and Engineering program solicitation for integrative activities in this field.

(1) *National Nanotechnology Initiative: The Initiative and its Implementation Plan*, National Science and Technology Council, Committee on Technology, Subcommittee on Nanoscale Science, Engineering, and Technology, Washington, DC, June 2002 (<http://www.nano.gov>).

(2) *Small Wonders, Endless Frontiers: A Review of the National Nanotechnology Initiative*, Committee for the Review of the National Nanotechnology Initiative, Division on Engineering and Physical Sciences, National Research Council, National Academy Press, Washington, DC, 2002 (http://www.nap.edu/catalog/10395.html?se_side).

Informational Meeting at NSF

NSF will hold an informational meeting after release of this solicitation to describe the intent of the NNIN program and to bring together individuals who may be interested in proposing to the competition. The meeting will also be web-cast for those unable to attend. Please consult the following NSF web page for information on the date, location, format, and web-cast of the meeting: <http://www.eng.nsf.gov/nnin>.

II. PROGRAM DESCRIPTION

The establishment of the NNIN – comprised of both large and small individual user facilities at sites that are geographically distributed and with diverse and complementary capabilities to design, create, characterize, and measure novel nanoscale structures, materials, devices, and systems – is intended to make these tools, instruments, and capabilities available widely to the nation's researchers for scientific and engineering experiments and to stimulate technological innovation. The new national network will encompass the full spectrum of science and engineering that spans the scale from the nano to the micro domain. The competition will build upon the strengths of the network concept, with the flexibility to grow or reconfigure as needs arise; the culture of open-access facilities for any research project of merit; the fostering of research, education, and outreach in diverse fields; the necessary investments in capital equipment, processes, tools, and instrumentation; and the expert staffing needed for such a role. Equally important will be providing the infrastructure for education, training, and workforce development in nanoscale science, engineering, and technology at all levels, including K-12, technician, undergraduate, graduate, and post graduate; and for outreach programs to reach potential users in the broader science and engineering communities whose work could benefit from advanced fabrication and instrumentation capabilities. The network should develop connections with other nationally funded academic centers in nanoscale science and engineering, and with facilities supported by other Federal agencies, State governments, the private sector, and non-U.S. institutions. Successful application and development of nanotechnology will require careful consideration and analysis of associated social and ethical phenomena. The network should incorporate opportunities for research and related activities on these aspects.

Proposing institutions are encouraged to include the broadest range of capabilities in their network proposal. The network should provide users access not only to the specialized tools, processes, and expertise for designing, simulating, and fabricating nano- and micro-scale structures, materials, devices, and systems, but also to the specialized instrumentation for analysis, characterization, probing, and manipulation of objects at these dimensions. The network should encompass capabilities for determining fundamental physical, chemical, and biological properties; for metrology, characterization, probing, manipulation, and control; for design, modeling, and simulation; for patterning, processing, fabrication, and integration; and for other special needs. The individual sites may focus on

particular subfields; however, the overall network should comprise facilities and instrumentation addressing needs across the broad science and engineering domains, including: physical-, chemical-, and biological-based nanostructures, materials, devices, and systems; nanoscale building blocks and nanostructured materials, composites, coatings, and surfaces; electronic, optical/photonic, magnetic, mechanical, thermal, and fluidic nanodevices and systems; geophysical, geochemical, and environmental nanostructures and processes; bioengineering and biomedical nanodevices and systems; process integration technologies, prototyping, and testing of manufacturing concepts; and other areas, as appropriate. Sites should have appropriate existing equipment base, materials and processes, tools and instrumentation. They should also have plans for acquisition of, and, where appropriate, to support the in-house development of, new tools, instrumentation, processes, and supporting technologies that will position and maintain their facilities at the frontier.

These infrastructure capabilities should enable broad support of the grand challenges outlined in the NNI and of recommendations in the NRC review of the NNI. These grand challenges are stated as Nanostructured Materials by Design; Nano-Electronics, Optoelectronics, and Magnetics; Advanced Healthcare, Therapeutics, and Diagnostics; Nanoscale Processes for Improving the Environment; Efficient Energy Conversion and Storage; Microcraft and Robotics; Nanotechnology for Bio-Chem-Radiological-Explosive Detection and Protection; Nanoscale Instrumentation and Metrology; and Manufacturing at the Nanoscale. The recommendations in the NRC review include emphasis on Research at the Intersection between Nanoscale Technology and Biology, and on the Invention and Development of New Instruments for Nanoscience.

Considerations for Individual Sites in the Network

The individual user facility sites will have considerable autonomy in their operation, management, and oversight as part of the overall network. Each institution must commit to providing the necessary infrastructure, including appropriate laboratory, clean room, and common space and sharing of equipment, in support of an external user community. The facilities must embrace a culture of open access to qualified researchers and mechanisms for encouraging non-traditional users from diverse disciplines. They should have an organizational structure that allows coordination of complex process steps and tools for integrated tasks, and acceptance of experimental risks associated with non-standard processes and materials. They should have strong underlying internal research programs that provide critical research mass and knowledge base in developing new processes, methodologies, and instrumentation. They should emphasize advanced educational opportunities for graduate and undergraduate students, technicians, postdoctoral associates, scientists, and engineers across a broad spectrum of disciplines. They should also have a technical staff with requisite expertise to serve external and internal users and to instruct in laboratory safety, process methods, and instrumentation usage. Some sites should support exploration of the social and ethical implications of nanotechnology.

Coordinating Features of the Network

It is desired that the network have the following coordinating features:

- Appropriate mixture of geographically-distributed large and small facilities that provide diverse and complementary capabilities to support current and anticipated user needs for nano and micro fabrication and characterization across a broad spectrum of science and engineering domains;
- Effective management structure to ensure close linkage and cooperation among the individual facilities such that they operate as a cohesive national network;
- Seamless methods of network operation that support complex user projects across facilities and remote users of facilities, through development of compatible internet-based software that includes awareness of current GRID and Middleware computer network tools;
- Simulation and modeling computational tools appropriate to design of nanoscale structures and systems, with plans for GRID-enabled collaborative use of new models and tools where appropriate;
- Coordination of education and outreach programs across the network;
- Dissemination of shared knowledge to research and development communities;
- Promotion of diversity among students, faculty, staff, management, and outreach activities;
- Appropriate user fee structures at all sites for academic, industry, government, international, and other researchers;
- Management team that includes a social scientist with a special interest in, and responsibility to coordinate, studies of the social and ethical implications of nanotechnology;
- Connections with other nationally funded academic centers in nanoscale science and engineering, and with facilities supported by other Federal agencies, State governments, the private sector, and non-U.S. institutions;
- Methods for assessment and metrics of network performance and impact;
- Mechanisms to encourage non-traditional users from diverse disciplines and to ensure that all facilities will reach at least 50% of users external to the institution;
- Planning process to accommodate emerging areas of nanoscale science, engineering, and technology and future growth of

- external and internal user base, including adding new sites to, or dropping existing sites from, the network; and
- Fostering additional support from non-NSF sources, including other Federal agencies, State governments, and the private sector.

Network Director and Site Directors

The network of user facilities will have a Network Director who will provide intellectual leadership for the network, be responsible for management and coordination of the activities of the network in a cohesive manner, and serve as the principal contact person on behalf of the network with the NSF. The Network Director shall be the Principal Investigator (PI) of the lead institution submitting the network proposal. The Network Director will be the key individual for developing strategies and operational plans for the network in cooperation with the Site Directors of the individual facilities and in consultation with an external advisory body of distinguished scientists and engineers. The Network Director will also coordinate annual review meetings with the NSF, and will serve as principal liaison with the outside communities for the promotion of the NNIN. More routine administrative responsibilities may be delegated, as appropriate, to other individuals. Individuals designated as Site Directors from the participating institutions will be responsible for local management functions of the individual user facilities, for interfacing with other facilities in the network and with the outside communities, and will serve on the management team for the overall network.

III. ELIGIBILITY INFORMATION

U.S. academic institutions with strong research and education programs in nanoscale science and engineering and with appropriate fabrication and/or instrumentation facilities are eligible to submit or participate in proposals for an integrated network of user facilities. An institution may propose inclusion of the same facility capabilities in only one network proposal. Non-academic U.S. institutions and organizations, including national laboratories and private-sector companies, as well as non-U.S. institutions, may participate in network activities using their own resources. Diversity is expected in both capabilities and geographic location of the participating facilities, including at institutions not well represented in the nation's research enterprise.

IV. AWARD INFORMATION

NSF plans support of a single national network. To ensure development of a comprehensive network, NSF may combine elements from more than one meritorious proposal. Approximately \$14 million will be available in this competition to fund the network for each year of the five-year award duration, beginning in FY 2004, pending the availability of funds. Awards will be in the form of cooperative agreements made directly with the lead institution and major participant institutions of the network. An individual institution within the network is limited to receiving a maximum of \$2.5 million per year for support of its facility. The lead institution may request funds beyond this limit for coordinated network purposes of management, outreach, and related activities. The initial award commitment will be for five years and may be renewed once, without recompetition, for an additional five years, subject to external merit review. Recompetition will be required after ten years. The size of an award will depend on the plans and capabilities of the proposed network.

Future competitions may be held to expand the scope of the National Nanotechnology Infrastructure Network established in the present competition by adding new sites and additional capabilities, contingent upon the availability of additional funding. The justification for any future competition will be based upon a demonstrated need to add specific capabilities to the network, a demand for resources that exceed the capacity of the established network, and a need to provide greater accessibility in particular regions of the nation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (required):

For NSF planning purposes, a non-binding letter of intent to submit a network proposal to this solicitation must be sent via e-mail to nninlet@nsf.gov by the date listed at the beginning of this solicitation. The letter of intent (in clear text, 2-page limit, with no attachments) should list the project title, PI/Network Director, lead institution, and other participating institutions, including designation of the respective Site Directors. Provide a brief summary discussion of the proposed network and of the funds to be requested.

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG), with the exception of deviations given in the specific instructions below. . The complete text of the GPG is available electronically on the NSF Website at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

PROPOSAL CONTENT

Proposals must contain the items listed below and adhere to the specified page limitations. No additional information may be provided by links to web pages.

Cover Sheet: Select the program solicitation number from the pull down list. A single NSF Unit of Consideration will then automatically be entered. FastLane allows one PI and at most four Co-PIs to be designated. Additional lead personnel should be designated as non co-PI Senior Personnel.

(A) Project Summary (2-page limit): Provide a summary description of the proposed network including discussion of its objectives and key features in a manner that will be informative to a general technical audience. The project summary must separately address both NSF review criteria of intellectual merit and broader impacts of the proposed activity. At the top of the page list the title of the network proposal and all participating institutions.

(B) Table of Contents: The Table of Contents is generated by FastLane and cannot be edited.

(C) Project Description: The project description section contains the following items a through g, and is limited to a combined total length of 35 pages, inclusive of tables, figures, or other graphical data.

a. List of Participants: Provide a listing, organized by institution and showing departmental affiliation, of the Network Director, Site Directors, and other faculty members or senior level personnel expected to have an important management role in the network project.

b. Vision and Goals: Describe the vision and goals for the proposed network, including its potential in enabling the nation's research and education infrastructure for nanoscale science and engineering and its broader educational and societal impacts.

c. Capabilities of the Network: Describe the full extent of fabrication and characterization instrumentation capabilities, the breadth of coverage of research fields and needs, specifying any areas that may lack coverage, the nature of user services to be provided, the mixture of large and small facilities and their geographic distribution, and the essential criteria required for a facility to be part of the network. Describe how external users will apply to the network, how non-traditional users will be encouraged, how projects will be accepted and assigned into the system, provisions to accommodate users both on site and remotely, the ability to accomplish user projects at individual sites or at multiple sites as needed, and provision for common simulation and modeling tools and laboratory software. Describe the planning and budgeting process for acquisition and development of new tools and instrumentation needed to position the facilities at the frontier over the duration of the award. Discuss plans to provide a broader national infrastructure for nanoscale science and engineering by developing connections between the network and other nationally funded academic centers, and facilities supported by government, the private sector, and non-U.S. institutions.

d. Capabilities of Individual Sites: For each proposed network site, describe the strengths, capabilities, disciplinary coverage and focus of the user facility. Describe the major fabrication and/or characterization tools, instrumentation and processes available, including the ability to accommodate and develop nonstandard processes and materials. (Detailed information on facilities, equipment, and other resources should be provided in Section (H), below.) Describe the in-house research programs of principal faculty members that underpin the site's capabilities and that would enable it to support development of new tools, instrumentation, and processes.

Discuss any past experience in operation as a user facility. Describe the commitment of the institution to providing appropriate laboratory, clean room, and common space, faculty and staff positions, capital equipment and instrumentation, and their maintenance and operation. Describe plans for staffing, accommodating external users, encouraging non-traditional users, user training, user fee structure, intellectual property policy, education, and outreach. Discuss plans at selected sites for research into the social and ethical dimensions of nanotechnology.

e. Education, Outreach, and Knowledge Dissemination: Describe how advanced educational experiences of graduate and undergraduate students, postdoctoral associates, and others will be emphasized within the facilities. Discuss the role of diversity and plans to attract high-quality U.S. students, especially women, racial and ethnic minorities who are members of groups underrepresented in science and engineering, and persons with disabilities. Describe educational outreach plans, including those to community colleges, minority-serving institutions, K-12 teachers and schools, and the broader community. Any planned activities such as research experiences for undergraduates and research experiences for teachers should be built in as part of the proposal. Describe outreach plans intended to increase the external user base, to reach scientific and engineering communities not traditionally involved in fabrication and characterization at the nanoscale or with access to the requisite advanced tools and instrumentation, and to foster emerging areas for the field. Describe provisions for knowledge dissemination to the broader research and technology communities.

f. Social and Ethical Implications: Describe plans for exploring associated social and ethical phenomena and implications of developments in nanotechnology. List the issues that will be core concerns; describe methodologies likely to be used to investigate these concerns; and indicate local researchers likely to be involved in the exploration of these issues. Describe plans to facilitate more broadly, and to coordinate across the network, cooperation and interchange between scientists and engineers in nanoscience-related fields and social scientists and ethicists studying nanotechnology.

g. Management Structure: Describe the management structure for the network and for the individual sites in the network. Discuss the method of selection, tenure, and responsibilities of the Network Director, individual Site Directors, and other management individuals. Describe provisions for network oversight, including external advisory bodies, their composition, responsibilities, and means of advising network management. Describe the methods for managing the external users program and for integrating the network's activities into academic programs. Discuss the planning process to determine overall network requirements, including the development of a vision for future nanoscale science and engineering research directions, needs, and capabilities; procedures for adding new sites to, or for dropping existing sites from, the network; allocation of resources; and prioritization of equipment acquisition, development, and staffing. Describe methods for assessment and metrics of network performance and impact. Describe the processes for setting goals, including promoting significant participation of non-traditional users and external users at all facilities.

(D) References Cited

(E) Biographical Sketches (2-page limit each for PI, co-PIs, and other Site Directors; 1-page limit each for other participants): Provide a biographical sketch for each participant listed above in Section (C)a. Include in the sketch a brief description of relevant current research support. (This information will not be required below in Section (G), below.) The sketch should describe the individual's academic and professional history and may list five significant publications and other activities or accomplishments. In choosing what to include, emphasize information that will be helpful in understanding the strengths, qualifications, and specific impact the individual brings to the network project.

(F) Budget: The lead institution shall submit the proposal. Other major participant institutions may submit as collaborative proposals. All other participating institutions should be included under subawards. Provide annual budgets for each year of five years for the overall network, as well as individual budgets for all participating institutions, including those that receive a subaward. The FastLane system will automatically fill out the cumulative five-year budget. Awarded funds that are not expended in the specific year requested may be carried over with appropriate justification to be provided in the annual report to NSF. An individual institution within the network is limited to receiving a maximum of \$2.5 million per year for support of its facility. The lead institution may, however, request funds beyond this limit for coordinated network purposes of management, outreach, and other activities. The major portion of NSF funds should be budgeted for operation and staffing of the user facilities and associated network activities. NSF funds may also be budgeted, as appropriate, for acquisition of, and to support the in-house development of, major instrumentation, tools, processes, and special-purchase laboratory software.

Budget Justification (3-page limit, each): Provide a justification for the funds requested in the major budget categories for the overall network and for each individual institution participating in the network. Describe the proposed allocation of funds with sufficient clarity to show how resources will be utilized in carrying out the proposed network activities. Describe the planned acquisition or development of major instrumentation, tools, processes, and special-purchase laboratory software. For each such item requested in the first year, include sufficient specificity in description, with explanation of the need, and any provision for maintenance and operating expenses.

(G) Current and Pending Support (This section is not required): Current research support should be described in Biographical Sketches, Section (E), above.

(H) Facilities, Equipment and other Resources (3-page limit per site; submit as a combined, single document): For each proposed network site, describe the facilities that are available, list the relevant major equipment and instrumentation housed in the facilities, and provide their estimated age, cost, and availability. Provide details of existing or proposed resource commitments from other organizations, such as government, industry, private foundations, and non-U.S. institutions, that will contribute to operation of the facilities.

(I) Supplementary Documentation: Submit official supporting letters that verify resource commitments by each institution participating in the network and by other organizations.

Proposers are reminded to identify the program announcement/solicitation number (03-519) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required in proposals submitted under this Program Solicitation.

Other Budgetary Limitations:

An individual institution within the network is limited to receiving a maximum of \$2.5 million per year for support of its facility. The lead institution may request funds beyond this limit for coordinated network purposes of management, outreach, and related activities.

C. Due Dates

Proposals must be submitted by the following date(s):

Letters of Intent (required):

April 07, 2003

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

May 16, 2003

Applicants are urged to submit proposals well in advance of the stated deadline to avoid any possible delays in use of the FastLane system.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the

proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued Important Notice 127, Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria

In responding to the above NSF review criteria, reviewers will be asked to place emphasis on the following additional criteria:

- Effectiveness in enhancing the national infrastructure for nanoscale science, engineering, and technology;
- Quality of the network structure and individual sites in providing diverse and complementary fabrication, characterization, and instrumentation capabilities on a national level;
- Quality of advanced educational experiences afforded, and attention to diversity issues;
- Quality and appropriateness of educational and scientific outreach and knowledge dissemination programs;
- Quality and appropriateness of plans for studying the social and ethical implications of nanotechnology;
- Strength of supportive in-house research programs and faculty at each site;
- Effectiveness of management structure, plans, and ability to coordinate and ensure high-quality user services across all sites; and
- Appropriateness of plans for assessment and metrics of network performance and impact, and for determining future needs.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and/or panel review to be followed by site review of meritorious finalists.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officers from the participating Directorates assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

For each proposal, a summary rating and accompanying narrative will be completed and submitted by each reviewer. A summary of the panel evaluation and recommendation will be completed by the panel. For those proposals receiving site reviews, a summary narrative of the site review team's evaluation and recommendations will also be provided. In all cases, reviews are treated as confidential documents. Verbatim copies of the individual reviews and panel summary, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF will inform applicants within three months after the submission deadline whether they have been selected to receive a site review. This notification will allow at least one month to prepare for the site review. Applicants submitting proposals will receive notice of the outcome of the competition within six months following the proposal submission deadline.

After programmatic approval has been obtained, the proposal recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a cooperative agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that make financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer do so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

Special Award Conditions:

Awards for this solicitation will be made as Cooperative Agreements to the lead institution and major participant institutions of the network.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

An annual review meeting will be held at one of the network sites, and a mid-year review at the NSF.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Lawrence S. Goldberg, Senior Engineering Advisor, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: lgoldber@nsf.gov
- Rajinder Khosla, Program Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: rkhosla@nsf.gov
- Bruce K. Hamilton, Division Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-7066, fax: (703) 292-9098, email: bhamilto@nsf.gov
- Cyrus Aidun, Program Director, Directorate for Engineering, Division of Chemical & Transport Systems, 525 N, telephone: (703) 292-8371, fax: (703) 292-9054, email: caidun@nsf.gov
- Charalabos Doumanidis, Program Director, Directorate for Engineering, Division of Design, Manufacture, & Industrial Innovation, 531 S, telephone: (703) 292-7088, fax: (703) 292-9056, email: cdoumani@nsf.gov
- Ken P. Chong, Program Director, Directorate for Engineering, Division of Civil & Mechanical Systems, 545 S, telephone: (703) 292-8360, fax: (703) 292-9053, email: kchong@nsf.gov
- Hugh M. Van Horn, Senior Scientist/Program Director (NAF), Directorate for Math & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4920, email: hvanhorn@nsf.gov
- Lynn Schneemeyer, Program Director, Directorate for Math & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4945, fax: (703) 292-9037, email: lschneem@nsf.gov
- Gerald B. Selzer, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: gselzer@nsf.gov
- S. Kamal Abdali, Division Director (Acting), Directorate for Computer & Information Science & Engineering, Division of Computer-Communications Research, 1145 S, telephone: (703) 292-8910, fax: (703) 292-9059, email: kabdali@nsf.gov
- Darleen L. Fisher, Program Director, Directorate for Computer & Information Science & Engineering, Division of Experimental and Integrative Activities, 1160 N, telephone: (703) 292-8980, fax: (703) 292-9030, email: dlfisher@nsf.gov
- Taieb Znati, Senior Program Director, Directorate for Computer & Information Science & Engineering, Division of Advanced Networking Infrastructure and Research, 1175 N, telephone: (703) 292-8949, fax: (703) 292-9010, email: tznati@nsf.gov
- Anne-Marie Schmoltner, Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8522, fax: (703) 292-9022, email: aschmolt@nsf.gov
- David Lambert, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8558, email: dlambert@nsf.gov
- Alexandra Isern, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, email: aisern@nsf.gov
- Rachelle D. Hollander, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7272, fax: (703) 292-9068, email: rholland@nsf.gov
- Duncan E. McBride, Section Head, Directorate for Education & Human Resources, Division of Undergraduate Education, 835 N, telephone: (703) 292-4630, fax: (703) 292-9015, email: dmcbride@nsf.gov

For questions related to the use of FastLane, contact:

- Gwendolyn Owens, Administrative Officer, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: gowens@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

Please consult the Program Solicitation NSF 02-148 for Nanoscale Science and Engineering (NSE), on the NSF web site at: <http://www.nsf.gov/pubs/2002/nsf02148/nsf02148.htm>

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090 or (800) 281-8749
- **To Order Publications or Forms:**

Send an e-mail to: pubs@nsf.gov

or telephone: (703) 292-7827

- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.

nsf.gov

[| About NSF](#) | [Funding](#) | [Publications](#) | [News & Media](#) | [Search](#) | [Site Map](#) | [Help](#)



The National Science Foundation
4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: 703-292-5111, FIRS: 800-877-8339 | TDD: 703-292-5090 or (800) 281-8749

[Policies](#)
[Contact NSF](#)
[Customize](#)