Collaborative Research in Computational Neuroscience (CRCNS)

Innovative Approaches to Science and Engineering Research on Brain Function

Program Solicitation

NSF 04-514

***Replaces Document* NSF 02-018**

National Science Foundation
Directorate for Computer and Information Science and Engineering
Division of Information and Intelligent Systems
Directorate for Biological Sciences
Directorate for Social, Behavioral, and Economic Sciences
Directorate for Engineering
Directorate for Mathematical and Physical Sciences

National Institutes of Health
National Institute of Neurological Disorders and Stroke
National Institute of Mental Health
National Institute on Drug Abuse
National Institute on Deafness and Other Communication Disorders
National Institute on Alcohol Abuse and Alcoholism
National Institute on Aging
National Eye Institute
National Institute of Biomedical Imaging and Bioengineering
National Institute of Dental and Craniofacial Research

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

December 10, 2003

December 01, 2004

December 01, 2005

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

January 30, 2004

January 05, 2005

January 05, 2006

REVISIONS AND UPDATES

In the Proposal Preparation Instructions, the Letters of Intent Instructions (Section V.A.) were updated to specify that letters of intent must be submitted by FastLane for the December 1, 2005 due date.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Collaborative Research in Computational Neuroscience (CRCNS)
Innovative Approaches to Science and Engineering Research on Brain Function

Synopsis of Program:

The most exciting and difficult challenge facing neuroscientists is to understand the functions of complex neurobiological systems. Computational neuroscience provides a theoretical foundation and set of technological approaches that may enhance our understanding of nervous system function by providing analytical and modeling tools that describe, traverse and integrate different levels of organization, spanning vast temporal and spatial scales and levels of abstraction. Computational approaches are needed in the study of neuroscience as the requirement for comprehensive analysis and interpretation of complex data sets becomes increasingly important. Collaborations among computer scientists, engineers, mathematicians, statisticians, theoreticians and experimental neuroscientists, are imperative to advance our understanding of the nervous system and mechanisms underlying brain disorders. Computational understanding of the nervous system may also have a significant impact on the theory and design of engineered systems.

This program solicitation is a continuation of NSF 02-018, released in November 2001. The overwhelming response to that solicitation brought about this logical follow-up and expansion of the program. This solicitation shall be in effect for a period of three years.

Participating Directorates of the National Science Foundation (NSF), and the Institutes of the National Institutes of Health (NIH) listed on the cover page of this solicitation, plan to support innovative interdisciplinary research in computational neuroscience. Both agencies recognize the need for research that focuses on integrating computational models and methods with neuroscience. This program is designed to encourage new collaborations at this interface.

Cognizant Program Officer(s):

- Kenneth Whang, Program Director, Directorate for Computer & Information Science & Engineering, Division of Information and Intelligent Systems, 1125 S, telephone: (703) 292-5149, fax: (703) 292-9073, email: kwhang@nsf.gov
- Bruce K. Hamilton, Division Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-8320, fax: (703) 292-9098, email: bhamilto@nsf.gov
- Paul J. Werbos, Program Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: pwerbos@nsf.gov
- Michael H. Steuerwalt, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4860, fax: (703) 292-9032, email: msteuerw@nsf.gov
- Mary Ann Horn, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, email: mhorn@nsf.gov
- R. Paul Malchow, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8421, fax: (703) 292-9153, email: rmalchow@nsf.gov
- Michael Smith, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, 995 N, telephone: (703) 292-4398, fax: (703) 292-9068, email: MSmith@nsf.gov
- Yuan Liu, Director, Computational Neuroscience and Neuroinformatics Program, National Institute of Neurological Disorders and Stroke, telephone: (301) 496-1917, email: liuyuan2@ninds.nih.gov

- Dennis Glanzman, Chief, Theoretical and Computational Neuroscience Research, National Institute of Mental Health, telephone: (301) 443-1576, email: dglanzma@mail.nih.gov

- David Shurtleff, Acting Director, Division of Neuroscience and Behavioral Research, National Institute on Drug Abuse, telephone: (301) 443-1887, email: david_shurtleff@nih.gov

- Barry J. Davis, Director, Taste and Smell Program, National Institute on Deafness and Other Communication Disorders, telephone: (301) 402-3464, fax: (301) 402-6251, email: davisb1@nidcd.nih.gov

- Roger Sorensen, Director, Neurochemistry, Neurotoxicology, and Molecular Pharmacology Program, National Institute on Alcoholism and Alcohol Abuse, telephone: (301) 443-2678, email: rsorense@willco.niaaa.nih.gov

- Judith Finkelstein, Program Director, Sensory/Motor Disorders of Aging Program, National Institute on Aging, telephone: (301) 496-9350, email: jf119k@nih.gov

- Michael Oberdorfer, Program Director, Visual Neuroscience Program, National Eye Institute, telephone: (301) 496-5301, email: oberdorfer@nei.nih.gov

- Grace Peng, Program Director, Discovery Science and Technology, National Institute of Biomedical Imaging and Bioengineering, telephone: (301) 496-9178, email: penggr@mail.nih.gov

- John Kusiak, Director, Molecular and Cellular Neuroscience Program, National Institute of Dental and Craniofacial Research, telephone: (301) 594-7984, email: kusiakj@mail.nih.gov

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

- 47.074 --- Biological Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.075 --- Social, Behavioral and Economic Sciences

CFDA numbers for NIH Institutes:

- 93.867 --- National Eye Institute
- 93.853 --- National Institute of Neurological Disorders and Stroke
- 93.866 --- National Institute on Aging
- 93.273 --- National Institute on Alcohol Abuse and Alcoholism
- 93.286 --- National Institute of Biomedical Imaging and Bioengineering
- 93.287 --- National Institute of Biomedical Imaging and Bioengineering
- 93.242 --- National Institute of Mental Health
- 93.173 --- National Institute on Deafness and Other Communication Disorders
- 93.279 --- National Institute on Drug Abuse
- 93.121 --- National Institute of Dental and Craniofacial Research

Eligibility Information

- **Organization Limit:** None Specified.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 15 to 20
- **Anticipated Funding Amount:** $5,000,000 per year, subject to 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:** Standard GPG Guidelines apply.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **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)*:**
  December 10, 2003
  December 01, 2004
  December 01, 2005
- **Full Proposal Deadline Date(s)** (due by 5 p.m. submitter's local time):
  January 30, 2004
  January 05, 2005
  January 05, 2006

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:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

Revolutionary opportunities have emerged for computationally driven advances in neuroscience research. These opportunities are recognized by the National Science Foundation (NSF), as well as by the National Institutes of Health (NIH). Research supported by the NSF in the computational and biological sciences and engineering, along with their ties to related research communities, and by the NIH in biological and biomedical fields make computational neuroscience an area where cooperation between the two agencies is appropriate.

The most exciting and difficult challenge facing neuroscientists is to understand the functions of complex neurobiological systems, i.e., how the elements of the nervous system execute computational tasks, integrate multiple inputs, and produce complex outputs. These elements and subsystems exist at all levels of organization, from the genetic determinants of protein structure to the complex interplay of individual neurons, neural circuits and systems in orchestrating behavior. Disorders of the nervous system are also associated with diverse and complex neurobiological changes leading to profound alterations at all levels of organization. We have seen a recent and dramatic increase in our knowledge of the genes, molecules and patterns of neural activity that control key biological events, but similar advances have not yet come about in our understanding of the computational principles that govern these dynamic changes in the nervous system.

Computational neuroscience provides a theoretical foundation and set of technological approaches that may enhance our understanding of nervous system function by providing analytical and modeling tools that describe, traverse and integrate different levels of organization, spanning vast temporal and spatial scales and levels of abstraction. Computational approaches are needed in the study of neuroscience as the requirement for comprehensive analysis and interpretation of complex datasets becomes increasingly important. Collaborations among computer scientists, engineers, mathematicians, statisticians, theoreticians and experimental neuroscientists, are imperative to advance our understanding of the nervous system and mechanisms underlying brain disorders. Computational understanding of the nervous system may also have a significant impact on the theory and design of engineered systems.

II. PROGRAM DESCRIPTION

Under this solicitation, the participating NSF Directorates and NIH Institutes (referred to as NSF/NIH units in this document) request proposals for research projects in computational neuroscience. In general, appropriate scientific areas of investigations are those that are currently supported by or related to the participating NSF/NIH units. Some specific examples are given below. Questions concerning a particular project's focus, direction and relevance to a participating funding unit should be addressed to the appropriate person in the list of NSF and NIH contacts.

Each of the NSF/NIH units participating in this program has a commitment to developing and supporting computational neuroscience research for the purpose of advancing the understanding of the questions relevant to the missions of the agencies.

Assurance of Innovative Collaborative Research Effort Across Scientific Disciplines

The driving principle behind this program solicitation is the recognition that projects crossing traditional academic disciplinary boundaries often bring about increased productivity and creativity when collaborative efforts include participation by scientists and engineers bringing their experience and training from widely varying backgrounds. Such interdisciplinary collaborations are a requirement for this program and must be demonstrated in the proposal; for example, by naming a co-principal investigator with academic credentials and appointment in an area different from that of the principal investigator, or by other

means. A typical research collaboration might include a computer scientist and a neurobiologist. Proposals should describe interdisciplinary work to be done. Another emphasis of this program is to encourage the development and utilization of novel and innovative computational approaches. Proposals that are not clearly innovative, collaborative, and interdisciplinary in nature will not be competitive for funding and may be returned without review.

The computational research that will be supported under this program must have impact on and relate to biological processes, and optimally will generate hypotheses that are testable in biological studies. It is expected that: (1) applications will include collaborations between computational and/or modeling experts, and neuroscientists; (2) collaboration will involve a dynamic and possibly protracted period of model development and refinement, and intense interactions among scientists and engineers from different disciplines; and (3) the development and testing of new models will provide a framework for the design of experiments and the generation of new hypotheses that can help reveal mechanisms underlying both normal and diseased states of the nervous system.

This program emphasizes innovative science and engineering approaches, encouraging the application and development of state-of-the-art computational tools by theoreticians, computational scientists, engineers, mathematicians, and statisticians to tackle dynamic and complex neuroscience problems. Research activities and computational approaches are supported at all levels of organization including molecular, cellular, systems, behavioral, and theory-based development studies. The following list of examples illustrates some areas of research that are appropriate under this solicitation. This list is not intended to be exhaustive.

- Develop explanatory, predictive and informative models and simulations of normal and abnormal functions of the nervous system and related disorders.
- Develop and improve mathematical, statistical and other quantitative analyses of research related to behavioral and cognitive neuroscience.
- Develop theoretical and computational approaches to delineate and understand neural circuits.
- Develop and improve algorithms for designing experiments and analyzing data related to genomic, proteomic, and other high-throughput technologies.
- Develop and improve algorithms for designing experiments and analyzing data related to structural and functional brain mapping technologies.
- Develop and improve algorithms for designing experiments and analyzing data related to normal biological rhythms and time courses of pathophysiological processes.
- Develop novel theoretical and computational methods that can be applied across multiple areas of neuroscience research.

Examples of topics amenable to these approaches include but are not limited to the following:

- Structural and functional relationship of neuronal specific molecules, such as ion channels, neurotransmitter receptors, and neural trophic factors;
- Neurotransmission, neuromodulation, and neural plasticity;
- Mechanisms underlying neuronal cell growth, cell death, and neurodegenerative disorders;
- Neurodevelopment and regeneration;
- Normal and abnormal sensory processing (vision, audition, olfaction, taste, balance, proprioception and somatic sensation);
- Motor control mechanisms and motor integration;
- Learning, representation, and encoding;
- Neurological disorders;
- Mental health related disorders;
- Alcohol and drug abuse related disorders;
- Aging related disorders;
- Cognitive functions and dysfunction; and
- Imaging and biomedical engineering technology that can be applied broadly to neuroscience.

Innovative educational and training opportunities are highly encouraged, to develop research capacity in computational neuroscience, to broaden participation in research and education, and to broaden the impact of computational neuroscience research. Activities at all levels of educational and career development are welcome under this solicitation.

Sharing of data and software is also highly recommended, to facilitate the translation and dissemination of research results, and to accelerate the development of generalizable approaches and tools that can be put to wide use by researchers.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

It is estimated that approximately $5.0 million will be available each year for this competition. Award sizes are expected to range from $100,000 to $500,000 in total costs per year (including indirect costs), with durations of 3 to 5 years. Most awards will be on the smaller end of this range. The maximum budgets of awards funded by the NIH will be $250,000 per year in *direct* costs. The maximum budgets of awards funded by NSF will be $500,000 per year in *total* costs. Estimated program budget, number of awards, and average award size and duration are subject to the availability of funds.

Upon conclusion of the review process, meritorious applications may be recommended for funding by either the participating NSF Directorates or NIH Institutes, at the option of the agencies, not the applicant. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency. (See section VI.C. for additional information on the NSF/NIH interagency process.)

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(required):*

Letters of intent must be submitted by FastLane. They should include:

1. The names and institutions/organizations of PIs, Co-PIs, and Senior Personnel
2. The title of the project
3. A 250-word synopsis of the project

Optionally, letters of intent may also include suggestions for reviewers.

The Principal Investigator should be listed as the point of contact.

See the GPG Appendix F, Part A for the definition of Senior Personnel.

Letters of intent will be used by the program to guide the selection of reviewers. PIs should not expect feedback on their letters of intent, beyond acknowledgment of their receipt.

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). The complete text of the GPG is available electronically on the NSF Website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=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.

Proposers are reminded to identify the program announcement/solicitation number (04-514) in the program announcement/ solicitation block on the NSF *Cover Sheet For Proposal to the National Science Foundation*. 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 by NSF in proposals submitted under this Program Solicitation.

Other Budgetary Limitations:

Budgets should include travel funds for the PI to attend an annual CRCNS Principal Investigators' meeting, most likely in the Washington, DC area.

C. Due Dates

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

Letters of Intent *(required):*

December 10, 2003

December 01, 2004

December 01, 2005

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

January 30, 2004

January 05, 2005

January 05, 2006

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: https://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 judgments.

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:

The goals of NIH-supported research are to advance our understanding of biological systems, improve the control of disease, and enhance health. In their evaluations of intellectual merit, reviewers will be asked to consider the following criteria that are used by NIH:

Significance
Does this study address an important problem? If the aims of the application/proposal are achieved, how will

scientific knowledge be advanced? What will be the effect of these studies on the concepts or methods that drive this field?

Approach
Are the conceptual framework, design, methods, and analyses adequately developed, well-integrated, and appropriate to the aims of the project? Does the applicant/proposer acknowledge potential problem areas and consider alternative tactics?

Innovation
Does the project employ novel concepts, approaches or methods? Are the aims original and innovative? Does the project challenge existing paradigms or develop new methodologies or technologies?

Investigator
Is the investigator appropriately trained and well suited to carry out this work? Is the work proposed appropriate to the experience level of the principal investigator and other researchers (if any)?

Environment
Does the scientific environment in which the work will be done contribute to the probability of success? Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements? Is there evidence of institutional support? (NOTE: Cost sharing is not required under this program solicitation. Any information in the application/proposal related to this criterion is not auditable.)

Where applicable, the following items will also be considered:

Protection of human subjects from research risk
The involvement of human subjects and protections from research risk relating to their participation in the proposed research will be assessed.

Inclusion of women, minorities and children in research
The adequacy of plans to include subjects from both genders, all racial and ethnic groups (and subgroups), and children as appropriate for the scientific goals of the research will be assessed. Plans for the recruitment and retention of subjects will also be evaluated.

Budget
The reasonableness of the proposed budget and the requested period of support in relation to the proposed research.

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.

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

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, 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 is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals 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 grant or other 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 makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants

and Agreements Officer does so at their own risk.

C. NSF/NIH Interagency Process

Program officers from participating NSF/NIH units will meet as soon as possible after proposals have been reviewed to formulate a set of funding recommendations consistent with the goals of the program. In doing so, the program officers will consider panel recommendations and other appropriate concerns such as program relevance and breadth of impact.

Those proposals selected for funding by NSF will be handled under the usual NSF processes. For those proposals that are selected for potential funding by participating NIH Institutes, the PI will be required to resubmit the original proposal and five copies on the PHS 398 application form directly to the Center for Scientific Review (http://www.csr.nih.gov/) at the NIH. Applications sent via the USPS EXPRESS or REGULAR MAIL should be sent to the following address:

Center for Scientific Review
National Institutes of Health
Suite 1040
6701 Rockledge Drive MSC 7710
Bethesda MD 20892-7710

The application must be received by CSR referral office on or before March 24, 2004, 2005, or 2006. Each of these applications must be accompanied by a cover letter that associates the application with the NSF/NIH CRCNS program. An applicant will not be allowed to increase the proposed budget or change the scientific content of the application in the resubmission to the NIH. These NIH applications will be entered into the NIH IMPAC II system. The results of the review will be presented to the involved National Advisory Council for the second level of review. Subsequent to the Council review, NIH Institutes will make their funding determination and selected awards will be made. Subsequent grant administration procedures for NIH awardees will be in accordance with the policies of NIH.

VII. NSF AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of an NSF 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 are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). 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/awards/managing/. Paper copies of these documents 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/publications/pub_summ.jsp?ods_key=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.

C. Reporting Requirements

For all multi-year grants awarded by NSF (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.

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:

- Kenneth Whang, Program Director, Directorate for Computer & Information Science & Engineering, Division of Information and Intelligent Systems, 1125 S, telephone: (703) 292-5149, fax: (703) 292-9073, email: kwhang@nsf.gov
- Bruce K. Hamilton, Division Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-8320, fax: (703) 292-9098, email: bhamilto@nsf.gov
- Paul J. Werbos, Program Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: pwerbos@nsf.gov
- Michael H. Steuerwalt, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4860, fax: (703) 292-9032, email: msteuerw@nsf.gov
- Mary Ann Horn, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, email: mhorn@nsf.gov
- R. Paul Malchow, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8421, fax: (703) 292-9153, email: rmalchow@nsf.gov
- Michael Smith, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, 995 N, telephone: (703) 292-4398, fax: (703) 292-9068, email: MSmith@nsf.gov
- Yuan Liu, Director, Computational Neuroscience and Neuroinformatics Program, National Institute of Neurological Disorders and Stroke, telephone: (301) 496-1917, email: liuyuan2@ninds.nih.gov
- Dennis Glanzman, Chief, Theoretical and Computational Neuroscience Research, National Institute of Mental Health, telephone: (301) 443-1576, email: dglanzma@mail.nih.gov
- David Shurtleff, Acting Director, Division of Neuroscience and Behavioral Research, National Institute on Drug Abuse, telephone: (301) 443-1887, email: david_shurtleff@nih.gov
- Barry J. Davis, Director, Taste and Smell Program, National Institute on Deafness and Other Communication Disorders, telephone: (301) 402-3464, fax: (301) 402-6251, email: davisb1@nidcd.nih.gov
- Roger Sorensen, Director, Neurochemistry, Neurotoxicology, and Molecular Pharmacology Program, National Institute on Alcoholism and Alcohol Abuse, telephone: (301) 443-2678, email: rsorense@willco.niaaa.nih.gov

- Judith Finkelstein, Program Director, Sensory/Motor Disorders of Aging Program, National Institute on Aging, telephone: (301) 496-9350, email: jf119k@nih.gov

- Michael Oberdorfer, Program Director, Visual Neuroscience Program, National Eye Institute, telephone: (301) 496-5301, email: oberdorfer@nei.nih.gov

- Grace Peng, Program Director, Discovery Science and Technology, National Institute of Biomedical Imaging and Bioengineering, telephone: (301) 496-9178, email: penggr@mail.nih.gov

- John Kusiak, Director, Molecular and Cellular Neuroscience Program, National Institute of Dental and Craniofacial Research, telephone: (301) 594-7984, email: kusiakj@mail.nih.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: (800) 673-6188, email: fastlane@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 MyNSF News Service (http://www.nsf.gov/mynsf/) to be notified of new funding opportunities that become available.

The NIH *Guide for Grants and Contracts* serves as the official publication of NIH policies, procedures, and availability of funds. Information about NIH extramural grant programs can be found in this publication, available electronically at http://grants.nih.gov/grants/guide/.

Funding opportunities of specific interest to computational neuroscientists include the following:

- Continued Development and Maintenance of Bioinformatics and Computational Biology Software (PA-02-141; http://grants1.nih.gov/grants/guide/pa-files/PA-02-141.html)
- Innovations in Biomedical Information Science and Technology: Phased Innovation Awards (R21/R33) (PAR-03-106; http://grants.nih.gov/grants/guide/pa-files/PAR-03-106.html) Note: Corrected dates listed in NOT-OD-03-044
- Innovations in Biomedical Information Science and Technology: SBIR/STTR Initiative (PAR-03-119; http://grants.nih.gov/grants/guide/pa-files/PAR-03-119.html) Note: Corrected dates listed in NOT-OD-03-044
- Tools for Collaborations That Involve Data Sharing (PA-03-134 http://grants1.nih.gov/grants/guide/pa-files/PAR-03-134.html)
- The Human Brain Project (http://www.nimh.nih.gov/neuroinformatics/)
- Science of Learning Centers (NSF 03-573; http://www.nsf.gov/slc/)
- Joint DMS/NIGMS Initiative to Support Research in the Area of Mathematical Biology (NSF 02-125; http://www.nsf.gov/cgi-bin/getpub?nsf02125)

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 (FASED) 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
- **To Order Publications or Forms:**

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

  or telephone: (301) 947-2722
- **To Locate NSF Employees:** (703) 292-5111

ABOUT THE NATIONAL INSTITUTES OF HEALTH

The National Institutes of Health (NIH) mission is to uncover new knowledge that will lead to better health for everyone. NIH works toward that mission by conducting research in its own laboratories; supporting the research of non-Federal scientists in universities, medical schools, hospitals, and research institutions throughout the country and abroad; helping in the training of research investigators; and fostering communication of medical information. The NIH institutes participating in this program contribute to NIH's mission through research efforts aimed at understanding, treating, and preventing disease states that involve or are related to the nervous system.

- NINDS supports research on the healthy and diseased brain, spinal cord, peripheral nerves, and mechanisms underlying neurological and neuromuscular disorders.
- NIMH supports an integrated program of basic and clinical research in biology, neuroscience, epidemiology, behavioral sciences as well as services research aimed at developing and assessing new approaches to diagnose, prevent and treat mental illness.
- NIDA supported research is aimed at increasing the understanding of the causes and consequences of drug abuse and addiction. NIDA supports a broad research program in basic and clinical research, neuroscience, epidemiology,

behavioral sciences and services research.

- NIDCD supports biomedical and behavioral research related to normal and disordered processes of hearing, balance, smell, taste, voice, speech and language. Basic and clinical studies of genetic, molecular, cellular, physiological, biochemical, and behavioral aspects of function in health and disease are encouraged.

- NIAAA supports a wide range of areas relevant to alcoholism and alcohol abuse including basic and applied research on the mechanisms of action of alcohol on biobehavioral processes and effects of alcohol on the nervous system.

- NIA supports biomedical, social, and behavioral research on the aging process and diseases of the aging organism, including basic science and clinical studies of the central and peripheral nervous system at genetic, molecular, cellular and systems levels.

- NEI supports basic and clinical research aimed at increasing our understanding of the eye and the visual system in normal health and disease.

- NIBIB promotes fundamental discoveries, design and development, and translation and assessment of technological capabilities in biomedical imaging and bioengineering, enabled by relevant areas of information science, physics, chemistry, mathematics, materials science, and computer sciences.

- NIDCR promotes the general health of the American people by improving their oral, dental and craniofacial health.

For the latest information about NIH programs, visit the NIH website at http://www.nih.gov/.

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.