

# Biological Databases and Informatics

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## Program Announcement

NSF 02-058

*Replaces Document nsf9991*



### National Science Foundation

Directorate for Biological Sciences

Division of Biological Infrastructure

## Full Proposal Target Date(s):

Second Monday in January

Second Monday in July

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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#### Program Title:

Biological Databases and Informatics

#### Synopsis of Program:

The mission of the Biological Databases and Informatics Program is to encourage new approaches to the management, analysis, and dissemination of biological knowledge that will enable both the scientific community and the broader public to gain maximum benefit and utility.

#### Cognizant Program Officer(s):

- Gerald F. Guala, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: [gguala@nsf.gov](mailto:gguala@nsf.gov)
- Manfred D. Zorn, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: [mzorn@nsf.gov](mailto:mzorn@nsf.gov)

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

- 47.074 --- Biological Sciences

## Eligibility Information

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

## Award Information

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- **Anticipated Type of Award:** Other - Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** Not Specified.
- **Anticipated Funding Amount:** \$8,000,000 Approximately \$8 million annually to support new activities, subject to the availability of funds

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- **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:** Not Applicable.

### C. Due Dates

- **Full Proposal Target Date(s):**  
Second Monday in January  
Second Monday in July

## Proposal Review Information

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- **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

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

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## I. INTRODUCTION

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The National Science Foundation (NSF) believes that future advances in the biological sciences will depend both upon the creation of new knowledge and upon effective management of proliferating information. The biological sciences have become increasingly data rich. Developing integrated views of species, development and evolution, documenting species diversity and tracking long-term environmental change are just a few examples of biological research programs that generate and require large amounts of archival information. Much of the biology of tomorrow will arise through discovery based on information contained in community-accessible databases. Much, if not all, of our accumulated knowledge of biology will be accessible in electronic form. Future progress in biological research will be highly dependent on the ability of the scientific community to both deposit and utilize stored information on-line. Thus, the information management challenge for the future will be to develop new ways to acquire, store and retrieve not only biological data per se, but also those data in the context of biological knowledge. The Directorate for Biological Sciences (BIO), through the Division of Biological Infrastructure (DBI), announces a cross-disciplinary effort to support the design, development, implementation, and use of information resources and tools. All fields of science supported by BIO are eligible for support under this Biological Databases and Informatics (BD&I) program. The mission of the BD&I Program is to encourage new approaches to the management of biological knowledge that render the collection, maintenance, dissemination and query of the data and information therein of greater utility to the scientific community. This program will not support disease-oriented research, including the etiology, diagnosis or treatment of physical or mental disease, abnormality or malfunction in human beings or animals, or the design and testing of drugs for treatment of such conditions is not appropriate for consideration.

## II. PROGRAM DESCRIPTION

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The terms "database development" and "biological informatics activities" describe a range of activities along a continuum, from formative, theoretical development of new algorithms, data structures and tools specific to the management of biological information to the development and utilization of established resources needed by whole communities of biological

researchers. The emphasis of the BD&I program as reflected in this announcement is on supporting proposals that address the formative stages of this continuum. Examples include theoretical research on data structures; new database architectures more tuned to the complexity of biology; planning and prototype development of new types of biological data- or knowledge-bases; and design of easy-to-use interfaces and tools for data input, manipulation, analysis and extraction.

Improving the informational infrastructure of the biological sciences will require a number of activities. Therefore, the objectives of the BD&I program are to encourage the following:

- development of new methods and tools for the construction, operation, and access of biological databases, including research into generic database infrastructures designed to be extendable to different biological domains;
- research into development of new data structures and new data-management systems for biological databases, for example, mass spectrometry of macromolecular complexes and other interaction technologies;
- research and development of "metadatabase" architectures for biology, for example, single query interfaces that present data from transparent queries across multiple databases;
- development of algorithms and software related to the retrieval and analysis of biological information;
- activities that will facilitate development of biological databases, and knowledge bases such as to standardize nomenclature, conceptual information models, and semantic content efforts;
- development (including planning and subsequent design, prototypes, implementation, testing, and distribution) of databases and related software tools crucial for biological research;
- activities that will facilitate the exchange of ideas among those involved in biological database research;
- activities (such as workshops, training, and collaborations between computer scientists and biological researchers) that will enhance development and use of information resources; and
- exploration and research on alternative economic models for long-term sustainable support of important community resources.

## Guidance on Community Databases

Databases of biological information evolve into community databases when their scientific value makes them useful to biological researchers. While the mission of the BD&I program encompasses all aspects of the above described continuum, this program announcement is geared towards facilitating the emergence of new types of database designs and informatics tools rather than databases of information per se. By definition, "Community Databases" have an established user-base and a well-established production mission and, as such, are expected to obtain financial support for this mission primarily from those programs (at NSF or elsewhere) that are most closely aligned to that user-base.

This BD&I program announcement specifically distinguishes and encourages proposals in research and development aspects of novel biological database structures (or informatics tools) both large and small, and discourages proposals focused only on maintenance and operation of databases. Note, however, that this stipulation does not constrain the staff of such community databases from submitting proposals that respond to this announcement.

When appropriate, BD&I will support international efforts in standard and public access databases.

## Planning Grants

Developing an adequate plan for work in biological databases and informatics activities often requires considerable preliminary effort. Accordingly, the NSF encourages applicants to consider submitting requests for support of planning and design activities.

### Conferences and Workshops

BD&I will help support national or international conferences, symposia, and workshops that enable leading scientists, engineers, scholars, policy makers, representatives of interested groups, and others to develop, evaluate, and share the planning and design of Biological Databases and Informatics activities. Meetings that are sponsored or co-sponsored by national associations or organizations, or that have concomitant support by other Federal agencies or private organizations, are especially encouraged. Supported conferences and workshops should reach a wide audience through rapidly published proceedings (either paper or electronic). The distribution of speakers and participants is expected to reflect the diversity of the scientific community. Support of junior investigators, post-doctorals and graduate students is especially appropriate, and selection mechanisms should encourage attendance by members of underrepresented groups.

### Other Activities

Proposals to carry out prerequisites necessary for Biological Databases and Informatics activities, such as working groups, nomenclature standardization efforts, etc., are appropriate. In particular, the BD&I program seeks to encourage activities that are designed to promote greater interactions between the computational sciences and biology in furtherance of the BD&I mission.

Applicants are encouraged to contact the appropriate NSF program officers to discuss their ideas prior to proposal submission.

## III. ELIGIBILITY INFORMATION

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The BD&I program will accept applications from eligible institutions as described in the NSF "Grant Proposal Guide" (GPG), NSF 02-2, Chapter I, Section C. The GPG is available on the NSF web site at the URL (<http://www.nsf.gov/cgi-bin/getpub?nsf012>). Paper copies of the GPG may be purchased from the NSF Publication Clearinghouse, P.O. Box 218, Jessup, Maryland 20794-0218, telephone (703) 292-7827, or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Consortia of eligible individuals or organizations may also apply, but a single individual or organization must accept overall management responsibility. International collaboration is encouraged; however, financial support for any non-U.S. participant organization must be provided from within the participant's country or other non-U.S. sources.

## IV. AWARD INFORMATION

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Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. NSF expects to make approximately 25 new awards per year depending on the quality of submissions and the availability of funds. Typical awards range from \$50K to \$500K per year for up to five years. NSF is committed to make "enabling" awards. All well-justified requests will receive serious consideration, including those with a budget larger than a typical size. For proposals received in July, the anticipated date of awards is January of the following year. For proposals received in January, the anticipated date of awards is July of the same year. C. Distribution of Materials As a condition of any award resulting from this program announcement, the awardee must agree that in the event of non-renewal of the award it will transfer to NSF or its designee, without condition or additional charge, a current version of the database or software. This should include current versions of all software necessary for entry submission and for database operation or tool operation, user and system documentation and documentation of database design (data dictionary, conceptual and physical schemata, integrity constraint documentation, and application source code and documentation.) D. Intellectual Property Rights The National Science Foundation makes no claim to copyright of inventions or writings that might result from BD&I awards. However,

should copyrightable materials result from the funded activity, grantees should be aware that they will be required to provide the Federal government with a non-exclusive, nontransferable, irrevocable, royalty-free license to exercise, or have exercised for or on behalf of the United States throughout the world, all the exclusive rights provided by copyright. In addition, grantees should be aware of the requirements for publication and distribution of technical materials developed with BD&I support. Grantees should also note their obligation to include an acknowledgment of NSF support (citing an award number) and, when required, a disclaimer of NSF responsibility resulting from BD&I support in all publications.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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#### 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/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](mailto:pubs@nsf.gov).

Include in proposals to BD&I the components listed in the GPG, Chapter II, Section C <http://www.nsf.gov/cgi-bin/getpub?gpg>. State information in each component as clearly and concisely as possible for merit review. Take special care in adhering to the requirements for page limitations, font size, and margins (see NSF Grant Proposal Guide Chapter II, Section C) <http://www.nsf.gov/cgi-bin/getpub?gpg>. Proposals not strictly adhering to the requirements of the GPG and these guidelines may be returned without review. Instructions and guidelines for the FastLane submission of proposals are detailed in Instructions for Preparing and Submitting a Standard Proposal via FastLane located at <http://www.fastlane.nsf.gov/a1/newstan.htm>. Also, see the "FastLane Submission" section below.

Guidelines are provided for specific sections of the proposal as follows:

#### Proposal Cover Sheet (NSF Form 1207):

Full proposals should be submitted through FastLane as described in the NSF-GPG. On the Cover Sheet Program Announcement/Solicitation component select NSF 02-058 as the Program Announcement. The Division of Biological Infrastructure (DBI) and Biological Databases and Informatics Program will automatically be assigned as the NSF Unit Consideration. Please note that submission of signed cover pages is no longer required. FastLane questions specific to BD&I can be directed to [biofl@nsf.gov](mailto:biofl@nsf.gov) <mailto:biofl@nsf.gov>.

#### Project Description (maximum length 15 pages):

Particular attention must be paid to the following major aspects in preparing a description of the proposed project. Although some relevant technical issues are mentioned below, these details are intended only as guidelines. This section must not exceed 15 pages inclusive of tables, diagrams or other visual material. Clearly label sections and major subdivisions of the project description.

Proposals should address the project goals, the anticipated product(s) of the new work and implications for biological databases and informatics with specific reference to the anticipated impact on the community served by the proposed developments, as well as the broader impacts of the proposed activities (See "Proposal Review Information" below for definitions of "broader impacts").

Proposals should discuss plans for making the products of research software and databases available to the biological

sciences research community.

Proposals should address and, where relevant, demonstrate evidence of scientific community need for the proposed work.

Proposals should present a well-developed plan for the long-term support and maintenance of the databases or informatics tools developed in the proposal. Some attention should be paid to possible alternative economic models of long term support to which a project, intent on maturing to a community database or widely used tool, might migrate. It should not be assumed that NSF will fund such projects in perpetuity.

Proposals should describe the management of intellectual property rights related to the proposed project, including plans for sharing data, information, and materials resulting from the award. This plan should be specific about the nature of the results to be shared, and the timing and means of release.

Proposals should describe specific plans to address broader impacts of the proposed activity (See "Proposal Review Information" below for the definition of "broader impacts").

### **Biographical Sketches (maximum two pages per person):**

For each of the key personnel, including senior staff and any other staff whose participation is critical to the success of the project, provide a curriculum vitae or short biographical sketch. Briefly describe relevant experience and list up to 10 publications (to include the individual's 5 most important and up to 5 other relevant publications).

### **Budget (NSF Form 1030):**

Provide a budget and budget justification for each year of support requested as well as a separate, cumulative budget for all years. If funds for subcontracts are requested, a separate budget and budget justification must be prepared by each subcontractor to show the distribution of subcontract funds across categories. Funds for facility construction or renovation may not be requested.

A detailed justification for funds in each budget category should be provided. For major equipment or software materials, a particular model or source and the current or expected price should be specified whenever possible. A brief explanation of the need for each item whose cost exceeds \$10,000 should be provided. This section should also include details of other sources of support for the project, such as government, industry, or private foundations.

### **Current Support (NSF Form 1239):**

Provide a complete list of current and pending support from all sources for all PIs and Co-PIs.

### **Facilities, Equipment, & Other Resources (maximum length 2 pages):**

Include a brief description of available facilities, including space and computational equipment available for the project. Where requested equipment or materials duplicate existing items, explain the need for duplication. This section is limited to 2 pages.

### **Special Information and Supplementary Documentation:**

Include an alphabetical list of current and past collaborators, of all key personnel whose biosketches are included, and of any other staff or collaborators mentioned by name in the proposal. Additionally, include names of all graduate students and postdoctoral fellows who have trained with these individuals, as well as anyone with whom these individuals have co-authored a paper within the last 4 years. The information may not exceed 2 pages for each individual.

Plans requiring collaborative effort by an individual not employed at the submitting institution(s) or subawardee's institutions should be supported by a signed letter from the individual. Besides indicating a willingness to collaborate, the letter should provide a brief outline of the goals of the collaboration and estimate the time and effort the individual expects to devote to the collaboration. Biographical sketches should not be provided for such individuals, unless requested by NSF. A collaborator whose primary purpose is advisory (e.g., service on a committee that will provide policy advice) does not need to provide such a letter.

Scan the letters and other relevant Special Information and Supplementary Documentation, as specifically described in the GPG, Chapter II, Section C, and put them in the Supplementary Documentation section of the proposal. Only documentation as described in the GPG, Chapter II, Section C and detailed above is allowed.

### **BIO Proposal Classification Form (PCF):**

Complete the BIO PCF, available on the NSF FastLane system. The PCF is an on-line coding system that allows Principal Investigators to characterize their projects when submitting proposals to the Directorate for Biological Sciences. Once PIs begin preparation of a proposal in the NSF FastLane system and select a division, cluster, or program within the Directorate for Biological Sciences as the first or only organizational unit to review the proposal, the PCF will be generated and available through the Form Preparation screen. Additional information about the BIO PCF is available in FastLane at <http://www.fastlane.nsf.gov/a1/BioInstr.htm>.

**IMPORTANT NOTE:** For technical assistance with FastLane, please send an e-mail message to [biofl@nsf.gov](mailto:biofl@nsf.gov). If you have inquiries regarding other aspects of proposal preparation or submission, please contact the cognizant program officer, preferably at least three weeks before the competition deadline.

Proposers are reminded to identify the program announcement/solicitation number (02-058) 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**

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#### **Cost Sharing:**

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

### **C. Due Dates**

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

#### **Full Proposal Target Date(s):**

Second Monday in January

Second Monday in July

### **D. FastLane Requirements**

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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](mailto: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

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### A. NSF Proposal Review Process

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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:**

In addition, reviewers of proposals to BD&I will focus on the following issues:

- responsiveness to the program scope;
- potential to advance biological research;
- effectiveness of the project's organizational plan to reflect technical advances and new scientific discoveries;
- extent to which the operation is focused on the research community's needs;
- soundness and openness of the information-sharing plan and management of intellectual property rights;
- quality of the training environment for junior scientists and/or mid-career scientist wishing to retool(if applicable); and
- commitment to promote participation of members of under-represented groups.

Where appropriate, reviewers will also consider:

- cohesiveness and soundness of the planned coordination for a multi-investigator project; and
- efficiency and cost-effectiveness of the proposed approach for infrastructure development
- soundness of the plan for maintenance of databases or software after the NSF award period

**B. Review Protocol and Associated Customer Service Standard**

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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 Mail and

or Panel Review. Site visits may be conducted if necessary. .

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.

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## VII. AWARD ADMINISTRATION INFORMATION

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### 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.)

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### 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](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](mailto: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/>.

### C. Reporting Requirements

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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.

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

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General inquiries regarding this program should be made to:

- Gerald F. Guala, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: [gguala@nsf.gov](mailto:gguala@nsf.gov)
- Manfred D. Zorn, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: [mzorn@nsf.gov](mailto:mzorn@nsf.gov)

For questions related to the use of FastLane, contact:

- email: [fastlane@nsf.gov](mailto:fastlane@nsf.gov)
- email: [biofl@nsf.gov](mailto:biofl@nsf.gov)

### IX. OTHER PROGRAMS OF INTEREST

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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.

Other Related Programs Support for Biological Databases and Informatics activities in biology may also be obtained from other programs within the National Science Foundation. Several research programs within the BIO Directorate support database applications within the context of research projects. In addition, the Information and Data Management program (<http://www.interact.nsf.gov/cise/html.nsf/html/idmPD/OpenDocument>) in the Information and Intelligent Systems Division (IIS) of the Directorate for Computer and Information Science and Engineering (CISE) supports computer science research on database systems. In determining where to seek support, recognize that Biological Databases and Informatics occur over a continuum, from database systems research to database application maintenance and data curation. The support of fundamental database research rests with the database program in IIS/CISE. Support of software application maintenance and data management rests with the appropriate BIO Directorate research program. Biological Information Technology and Systems (BITS) (<http://www.interact.nsf.gov/cise/descriptions.nsf/3bd00f847564ebce8525678d00604909/f52a50d678b93cb185256a29004f86a4/OpenDocument>) support high risk/high return research at the interface of biology and information. Determining what needs to and what can be learned about information processing in biological systems should lead to important new information systems and technologies. The program focuses on developing computational models and theories for the information processing mechanisms encountered in biological systems. Quantum and Biologically Inspired Computing , QuBIC, (<http://www.interact.nsf.gov/cise/descriptions.nsf/3bd00f847564ebce8525678d00604909/0f3c081dc604ceb285256a22006ab543?OpenDocument>) supports interdisciplinary research to improve the fundamental capabilities of computer science by incorporating insights from either biological system or quantum foundations or both. BioComplexity in the Environment, BE, (<http://www.nsf.gov/home/crssprgm/be/>) supports a range of research activities. The BE program is a multi-year investment designed to promote new approaches to investigating the interactivity of biota and the environment. The primary mission of BDI is to bridge the gap between database and algorithm research in a computer science context and application maintenance or data management. The mechanism is the support of activities that would be considered too applied in the computing context and too technical or theoretical for a research program in BIO.

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