

NSF 01-99



NATIONAL SCIENCE FOUNDATION

4201 Wilson Boulevard
Arlington, VA 22230

Dear Colleague,

This letter calls to your attention a new research opportunity in BIODIVERSITY AND ECOSYSTEM INFORMATICS (BDEI). This opportunity seeks to support proposals for high-risk, small-scale planning (less than \$50,000) or incubation (less than \$100,000) activities that will likely catalyze rapid and innovative advances in the new interdisciplinary research community of biodiversity and ecosystem informatics. Subject to the availability of funds, about \$1.05 Million is available from NSF. Both USGS and NASA may provide additional funding depending on availability of funds and quantity/quality of proposals. 15-20 awards are anticipated. This is a call for incubation/planning research or workshop proposals to be conducted as part of the existing Digital Government research program (see <http://www.nsf.gov/cgi-bin/getpub?nsf99103>) within the Division of Experimental and Integrative Activities (EIA) of the NSF Directorate for Computer and Information Science and Engineering (CISE). Collaborating agencies and NSF programs for this opportunity include:

- National Science Foundation
 - Digital Government program (CISE Directorate)
 - Information and Data Management program (CISE Directorate)
 - Biological Databases and Informatics program (Biological Sciences Directorate)
 - Biological Oceanography program (Geosciences Directorate)
- National Aeronautics and Space Administration
- United States Geological Survey

Grants made under this opportunity would be expected to produce tangible results within 12-18 months. It is anticipated that the interdisciplinary groups can then continue to work together to build on these pilot activities and thus participate more effectively in other, larger informatics research competitions. Successful proposals in response to this letter will foster novel and synergistic interdisciplinary work between the computer and information science community and the biodiversity and ecological science community; it is hoped that a new community of researchers will be the result. Rather than incremental extensions of current work, proposals are

expected to address new and exciting Computer Science and Information Technology (CS/IT) research directions, while at the same time helping to identify the next-generation biodiversity and ecosystems information infrastructure. Proposals that involve collaborations with one or more Federal agencies are strongly encouraged.

Background

Biodiversity and ecosystem informatics R&D has been identified as a critical national priority. The President's Committee of Advisors on Science and Technology (PCAST) Panel on Biodiversity and Ecosystems (<http://www.ostp.gov/Environment/html/teamingcover.html>), the President's Information Technology Advisory Committee (PITAC) (<http://www.itrd.gov/ac/report>), and the Office of Science and Technology Policy's Committee on Environment and Natural Resources (OSTP/CENR) (<http://www.ostp.gov/html/0076.html>) have all recommended significantly increased activity in this area. The National Research Council's Committee on Grand Challenges in Environmental Sciences has recently identified the need for fundamentally increased understanding of biodiversity and ecosystem functioning as one of the eight "Grand Challenges in Environmental Science" facing our Nation and the world today (<http://books.nap.edu/books/0309072549/html/R1.html#pagetop>).

In response to a request by PCAST and CENR, a national-level Workshop on Biodiversity and Ecosystem Informatics was convened on June 22–23, 2000, at the NASA Goddard Space Flight Center. The goal of the workshop (<http://bdi.cse.ogi.edu>) was to develop an informatics research agenda focusing on the significant and unique CS/IT challenges and opportunities in the biodiversity and ecosystem domain.

Informatics Challenges

In order to effectively address the highly complex environmental science questions of the 21st century, scientists, resource managers, decision makers, and interested citizens will need access to an entirely new generation of computer systems, tools, and capabilities. We currently lack the capability to effectively deal with the challenges of collecting, maintaining, analyzing, and understanding the huge amounts of biodiversity and ecosystems data that have been collected over the past 200 years - not to mention the new data which are being collected each day. These challenges reflect the fundamentally complex nature of biodiversity and ecosystems data (molecular and genetic diversity, species diversity, population and community-level diversity, ecosystem diversity); extremely large and widely distributed data sets in disparate forms and formats (including irreplaceable data that are not currently digital); and the need to support analysis and interpretation at varying spatial and temporal scales, including *in-situ* (wireless) computation and information access. It is expected that this call for proposals will push the boundaries in information representation, acquisition, integration, analysis, synthesis, access, use and long-term preservation. In many cases, wholly new approaches to geospatial and temporal data management will be required, as well as advances in areas such as computer-mediated collaboration, modeling and visualization, knowledge discovery, data mining, and remote sensing.

Meeting these challenges will benefit a wide range of information domains and directly affect the future health and sustainability of biological diversity and our natural environment, including such crucial issues as species and habitat loss, invasive species, emerging diseases, effects of

global change on ecosystem processes, and the restoration of lost or damaged ecosystems. It could also ultimately provide us with the advanced capabilities needed to support true "ecological forecasting," thus proving of immense value to the successful execution of government agency missions.

Relevant Research Topics

The goal of this announcement is to help further elucidate the special informatics research challenges and opportunities of this important domain and to provide initial support that can foster new types of interdisciplinary collaborations and team-building among scientists in CS/IT and biodiversity/ecological science. Research or workshop proposals in the following major areas are encouraged:

- Proposals that highlight and seek to demonstrate novel approaches to understanding the unique and fundamentally complex nature of the data, processes, and problems that characterize the biodiversity and ecosystems domain. This can include issues of inherent data complexity, naming (ontological) complexity, spatio-temporal complexity, and socio-technical complexity.
- Proposals that provide small-scale, ground-breaking demonstrations of new approaches to the acquisition and integration, analysis and synthesis, or dissemination and use of actual biodiversity and ecosystems data.
- Proposals that develop and demonstrate the value of new technological and infrastructure approaches to supporting meaningful, long-term interdisciplinary collaborations specifically for biodiversity and ecosystems informatics research.

The list above is not meant to be exhaustive; other innovative ideas are welcome.

Other Related Opportunities

Researchers with interests in larger, longer-term, more fully-developed studies in the area of biodiversity and ecosystems informatics should be aware of separate competitive opportunities available through the NSF and NASA. These include:

- NSF's Information Technology Research (ITR) initiative (<http://www.itr.nsf.gov>).
- The NSF Biological Databases and Informatics Program (NSF 99-91) (<http://www.nsf.gov/pubs/1999/nsf9991/nsf9991.htm>)
- NASA's Earth Science, Space Science, and Biological and Physical Research Enterprises (<http://research.hq.nasa.gov/>)
- U.S. Geological Survey's National Biological Information Infrastructure (NBII) (<http://www.nbio.gov>) nodes and Gap Analysis Program (<http://www.gap.uidaho.edu/>)

What proposers are expected to do after award

Throughout the year, the collaborating agencies (NSF, NASA, USGS) will also provide access to "community building" resources that can help interested CS/IT and biodiversity/ecological

science researchers build new interdisciplinary partnerships. Currently under development these will include: a web-based biodiversity and ecosystems informatics information service will highlight availability of special "challenge problems;" availability of particularly interesting and challenging biodiversity and ecosystems data sets for use as test beds; bulletin board services to allow researchers to locate potential co-investigators from other domains; and announcements of opportunities for interdisciplinary sessions at workshops and conferences.

Points of Contact

National Science Foundation

Primary contact, especially for administrative matters:

Larry Brandt
Digital Government Program
Phone: 703-292-8980
lbrandt@nsf.gov

Other NSF points of contact, especially for technical matters:

David Garrison
Biological Oceanography Program
Phone: 703-292-8582
dgarriso@nsf.gov

Sylvia Spengler
Biological Databases and Informatics Program
Phone: 703-292-8470
sspengle@nsf.gov

Maria Zemankova
Information and Data Management Program
Phone: 703-292-8930
mzemanko@nsf.gov

National Aeronautics and Space Administration

Woody Turner
NASA Headquarters
Earth Science Enterprise
Phone: 202-358-1662
wturner@mail.hq.nasa.gov

John Schnase
NASA Goddard Space Flight Center
Earth and Space Data Computing Division
Phone: 301-286-4351
jschnase@gsfc.nasa.gov

James A. Smith

NASA Goddard Space Flight Center
Laboratory for Terrestrial Physics
Phone: 301-614-6020
jasmith@hemlock.gsfc.nasa.gov

U. S. Geological Survey

Anne Frondorf
National Biological Information Infrastructure Program
Phone: 703-648-4205
anne_frondorf@usgs.gov

Administrative Details

Proposals submitted in response to this letter should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG) (<http://www.nsf.gov/cgi-bin/getpub?nsf012>) and the requirements of the NSF Digital Government Program Announcement (<http://www.nsf.gov/cgi-bin/getpub?nsf99103>). Proposals should have the title prefaced by: **BDEI:** The Project Summary should include the proposal title, all collaborators with their institutions, and up to 8 BDEI-representative keywords. Unlike GPG requirements, proposals should be no more than 5 pages in length, including a clear research or workshop plan and expected results. Proposers are reminded to identify the Dear Colleague number (NSF 01-99) in the Proposal Announcement/Solicitation No. block on NSF Form 1207, the cover sheet for the proposal to NSF. Please plan and budget for attendance at a Principal Investigators' Workshop, to be held at the end of the first year, in the Washington DC metropolitan area. As with all proposals in response to 99-103, proposals should be submitted by the second Wednesday of July, 2001 through the NSF FastLane system (<http://www.fastlane.nsf.gov>). NSF plans to make award decisions by August, 2001 with awards to follow no later than September 2001. For more information, please contact Lawrence E. Brandt, Program Director for Digital Government, at lbrandt@nsf.gov. Email is encouraged, but phone is also possible at (703) 292-8980.

W. Richards Adrion
Director, Experimental and Integrative Activities Division

CFDA No. 47.070
OMB 3145-0058