

Data Infrastructure Building Blocks (DIBBs)

PROGRAM SOLICITATION

NSF 12-557

REPLACES DOCUMENT(S):
NSF 07-601, NSF 07-565



National Science Foundation
Office of Cyberinfrastructure

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

July 26, 2012

Conceptualization Track

August 30, 2012

Implementation & Interoperability Tracks

IMPORTANT INFORMATION AND REVISION NOTES

As a comprehensive program to meet the data need of NSF's scientific communities, this solicitation incorporates some but not all of the goals of the former DataNet and InterOp programs, and introduces a new Conceptualization track.

Important Reminders

A revised version of the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)*, [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to proposals submitted in response to this funding opportunity.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG) Chapter II.C.2.g (xi)* for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

For the purposes of the DIBBs Program, Data Management Plans should explicitly state how the data generated by the project will be managed, stored, and made accessible. It should also clearly define rights, obligations, roles and responsibilities of all parties.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Data Infrastructure Building Blocks (DIBBs)

Synopsis of Program:

Science and engineering research and education are increasingly digital and increasingly data-intensive. Digital data are not only the output of research but their analysis provide input to new hypotheses, enabling new scientific insights, driving innovation and informing education. Therein lies one of the major challenges of this scientific generation: how to develop, implement and support the new methods, management structures and technologies to store and manage the diversity, size, and complexity of current and future data sets and data streams.

NSF's vision for a Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) considers an integrated, scalable, and sustainable cyberinfrastructure as crucial for innovation in science and engineering (see www.nsf.gov/cif21). Data Infrastructure Building Blocks is an integral part of the CIF21 portfolio and seeks to provide support for the following research activities:

Conceptualization: Conceptualization Awards are planning awards aimed at further developing disciplinary and interdisciplinary communities' understanding of their data storage and management requirements with the goal of developing an initial prototype. Any activity that brings the community together to address common problems, further refine requirements and avoid unnecessary and wasteful duplication of resources and efforts will be eligible for funding. Funded activities could include focused workshops, special sessions at professional meetings, focus groups, etc. Awards will be up to 1 year in duration. The output of a conceptualization award will be design specifications for creating a sustainable data infrastructure that will be discoverable, searchable, accessible, and usable to the entire research and education community.

Implementation: Implementation awards will support development and implementation of technologies addressing a subset of elements of the data preservation and access lifecycle, including acquisition; documentation; security and integrity; storage; access, analysis and dissemination; migration; and deaccession. These data preservation and access technologies will enable science and engineering research, such that the scientific and engineering problems serve as use cases for data technology development. Awards will be up to 5 years in duration.

Interoperability: Interoperability awards will develop frameworks that provide consistency or commonality of design across communities and implementation for data acquisition, management, preservation, sharing, dissemination, etc. This includes data and metadata format and content conventions, standardized constructs or protocols, taxonomies, or ontologies. The development of interoperability frameworks through community-based mechanisms provides a means for ensuring that existing conventions and practices are appropriately recognized and integrated, that implementation is made realistic and feasible, and, most importantly, that the real needs of the community are identified and met. Awards will be up to 3 years in duration.

The Office of Cyberinfrastructure (OCI) is partnering with Directorates and Offices across the foundation to support DIBBs, a program to develop data infrastructure usable by multiple scientific disciplines, recognizing these disciplines may vary in their current state of development. The goal of DIBBs is to foster cross-community infrastructure development that solves common problems, while building blocks of data infrastructure that can support and provide data solutions to a broader range of scientific disciplines while reducing duplicative efforts.

In particular, the Geosciences Directorate is interested in using DIBBs to support its EarthCube activities, seeking to develop data infrastructure building blocks needed across and beyond the geosciences community. Context and objectives for EarthCube can be found at EarthCube.ning.com. Math and Physical Sciences will use DIBBs in support of existing efforts to ensure disparate data are widely interoperable; will consider proposals for efforts that are complementary to existing infrastructure; and will consider proposals that offer availability, accessibility, and broad usability to heterogeneous data sets. The Directorate for Social, Behavioral and Economic Sciences encourages SBE scientists to utilize DIBBs to follow-up on activities begun by our other CIF21 initiatives: META-SSS (www.nsf.gov/pubs/2011/nsf11583/nsf11583.htm) and, together with the Directorate for Education and Human Resources, BCC-SBE/EHR (www.nsf.gov/funding/pgm_summ.jsp?pims_id=504747&org=OCI). For information on the priorities of other Offices/Directorates please contact the appropriate CIF21 representative, listed on the CIF21 contact page (www.nsf.gov/cif21).

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Robert Chadduck, telephone: 703-292-8970, email: rchadduc@nsf.gov
- Mimi McClure, telephone: (703) 292-5197, email: mmclure@nsf.gov
- Dane Skow, telephone: (703) 292-4551, email: dskow@nsf.gov

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

- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Standard Grant or Cooperative Agreement

Estimated Number of Awards: 17 to 19

Conceptualization Awards: 8-10 awards pending availability of funds.

Implementation Awards: 4 awards pending availability of funds.

Interoperability Awards: 5 awards pending availability of funds.

Anticipated Funding Amount: \$41,500,000 pending availability of funds; the average award size for conceptualization awards is anticipated to be \$100,000 for one year; the average award size for implementation awards is anticipated to be approximately \$8 million total over 5 years; the award size for interoperability awards is anticipated to be up to \$1.5 million total over 3 years.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

PI Limit:

PIs and Co-PIs may only apply to one of the three tracks, although they may be senior personnel on more than one.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

PIs and Co-PIs may only apply to one of the three tracks, although they may be senior personnel on more than one.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- Letters of Intent: Not Applicable
- Preliminary Proposal Submission: Not Applicable
- Full Proposals:
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. 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.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- Cost Sharing Requirements: Inclusion of voluntary committed cost sharing is prohibited.
- Indirect Cost (F&A) Limitations: Not Applicable
- Other Budgetary Limitations: Not Applicable

C. Due Dates

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

July 26, 2012

Conceptualization Track

August 30, 2012

Implementation & Interoperability Tracks

Proposal Review Information Criteria

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.

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I. INTRODUCTION

NSF's Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) investment focuses on the interconnected cyberinfrastructure components necessary to realize the research potential of theoretical, experimental, observational and simulation-based research efforts. The CIF21 data cyberinfrastructure component builds on and extends NSF commitments to the preservation of and access to critical high-value datasets generated by federally funded science and engineering research programs. In addition, NSF seeks to foster the requisite communication and planning within and across scientific domains that will allow the community to assess its data requirements and come up with common ways to address those needs that respect the fundamental or intrinsic differences between domains.

For purposes of this solicitation, data are defined as any information that can be stored in digital form and accessed electronically, including, but not limited to, numeric data, text, publications, sensor data streams, video, audio, algorithms, software, models and simulations, images, etc. Digital data are both the output of research and their analysis provides input to new research hypotheses. New methods, management structures and technologies are required to manage the diversity, size, and complexity of current and future data sets and data streams. Also required are data services to support acquisition; documentation; security and integrity; storage; access, analysis and dissemination; migration; and deaccession (that is the process of removing objects from a collection) of data archives and repositories generated by federally funded research programs.

II. PROGRAM DESCRIPTION

Program Goals

The specific goals of this program are to support the development or expansion of new types of digital data storage, preservation, and access that: (1) enable engagement at the frontiers of science and engineering research and education; (2) work cooperatively and in coordination to overcome conventional barriers due to data type and format, discipline or subject area, and time and place to facilitate sharing of data; (3) combine expertise in cyberinfrastructure; library and archival sciences; computer, computational, and information sciences; and various domain sciences; (4) lead to long-term governance models for economic and technological sustainability over multiple decades.

A DIBBs proposal must describe the vision and rationale for the data service and infrastructure, as building blocks must be service oriented, taking into account accessibility, usability and the value they provide to science and engineering researchers. The data service rationale must also demonstrate a strong and credible connection to the communities it serves and to other essential cyberinfrastructure capabilities required by that community. The proposal must make a compelling case for its likely impact on the target communities, with actual (or potential in the case of conceptualization awards) community support and usage, technology testing and adoption approaches specified.

DIBBs awards are subdivided into Conceptualization, Implementation and Interoperability awards, which are described below. PIs and co-PIs may only apply to one of the three tracks, although they may be senior personnel on more than one.

(a) Conceptualization Awards: DIBBs Conceptualization Awards are planning awards aimed at further defining disciplinary and interdisciplinary communities' data storage and management requirements. Example activities may include focused workshops, special sessions at professional meetings, focus groups, etc., but any activities that promote the fundamental goal of specifying solutions to common problems and avoiding unnecessary and wasteful duplication of resources will be eligible for funding. Awards will be up to 1 year in duration. The output of a conceptualization award will be design specifications for creating a sustainable data infrastructure that will be discoverable, searchable, accessible, and usable to the entire research and education community. The resulting specifications, potentially implemented in an initial prototype, may serve as the conceptual design upon which a subsequent Implementation or Interoperability proposal could be based. The conceptualization proposal should identify:

- the science community and the specific grand challenge research questions to be supported (for a discussion of grand challenges see www.nsf.gov/od/oci/taskforces/TaskForceReport_GrandChallenges.pdf);
- potential approaches for governance and long-term sustainability of the data infrastructure as well as the data themselves;
- specific data elements and frameworks relevant to the community and the sustainability challenges to be addressed;
- appropriate data storage architectures and lifecycle processes, development, testing and deployment methodologies, validation and verification processes, including the need for and role of experimentation and observation, end usability and interface considerations, data curation and required infrastructure and technologies;
- the required organizational, personnel and management structures, project plans and operational processes;
- specific assumptions regarding key linkages of the proposed data infrastructure to other cyberinfrastructure capabilities such as networking and computation;
- mechanisms for human resource development, including integration of education and training, mentoring of students, postdoctoral fellows as well as data professionals, and proactively addressing diversity and broadening participation;
- potential risks, including those associated with establishing and maintaining the infrastructure;
- metrics for evaluation of effectiveness in meeting the needs of the community.

(b) **Implementation Awards:** Implementation awards will support development and implementation of technologies related to the data preservation and access lifecycle, including acquisition; documentation; security and integrity; storage; access, analysis and dissemination; migration; and deaccession. Implementation awards must also address how they will relate to and support other CIF21 components essential to the given community (see www.nsf.gov/cif21). These data preservation and access technologies will enable science and engineering research, such that the scientific and engineering problems serve as use cases for data technology development. Proposals should specify NSF funded research communities constrained by similar data problems. Their problems and related community requirements should be specified in documentation (e.g. a workshop report, initial prototype evaluation report), for example, as the outcomes of a DIBBs conceptualization award. Successful implementation of the data technology across multiple scientific communities will demonstrate scalability, while serving as a resource multiplier for science.

The composition of Implementation teams should appropriately reflect the need to implement, test and evaluate data technologies in multiple scientific domains. As appropriate to the scope, teams may also include national or international digital preservation/access organizations with the goal of developing seamless, single entry point discovery, access, and use of data from across the network. Teams may seek to develop and disseminate best practices, policies and principles.

Implementation projects are expected to be the logical extension of well-developed existing efforts in data storage, access and curation. These efforts must be able to successfully and convincingly address, through demonstrable deep and extensive experience, all of the elements required as the outcomes of the conceptualization type awards. The focus for the Implementation awards is on the full and complete implementation of carefully constructed project plans that are grounded in and responsive to the needs of communities of NSF researchers for discovering, searching, accessing and using high value datasets resulting from federally funded research programs.

(c) **Interoperability Awards:** Interoperability Awards support community efforts to provide broad interoperability of datasets, enhancing interaction and information sharing to benefit all areas of NSF-funded science, engineering and education. The program supports the formation of Data Interoperability Networks (hereafter, 'Networks') that enable communities to work together in the development of effective strategies and tools for data interoperability.

Each Network is responsible for: (1) enabling broad community engagement in the development of consensus and agreement on strategies, priorities, and best approaches for achieving broad interoperability; and (2) providing the technical expertise necessary to turn consensus and agreement into robust interoperability tools and resources for their broad use and implementation. Proposals for activities not based on significant community engagement and consensus-building activities will be deemed unresponsive to this solicitation and will be returned without review.

Networks shall consist of members from the science, engineering and education communities supported by NSF, with the goal of providing interoperability across a wide variety of disciplinary domains, topic areas, and/or data types and sources. Members may include individuals, professional societies and organizations, community database and information resource managers, etc. Network size should scale with the scope of the interoperability goals. While an initial core group of participants may be identified in the proposal, an immediate goal should be to expand participation in the Network and to become an organization that is fully embraced by the relevant communities. Credible mechanisms for achieving this goal, maintaining openness, ensuring access, and actively promoting broad participation should be explicitly described in the proposal.

A single organization must serve as the lead for each proposal, with support for all other organization members provided through subawards. The PI is the designated contact person for the Network and is expected to provide leadership in fully coordinating and integrating the activities of the group.

Common Elements

The DIBBs program recognizes that scientific communities differ in their stages of data infrastructure development, including the requisite community building and establishment of governance structures and mechanisms for financial and operational support, to effectively deploy and manage data cyberinfrastructure. At an early stage there will be a need for moving an established multi-disciplinary community to the next step, where common problems and common approaches to their solution are further refined (Conceptualization track). Proposals to the Implementation and Interoperability tracks should provide clear evidence of having already achieved the goals specified in the Conceptualization track.

DIBBs Implementation and Interoperability proposals should also include a clearly defined management plan. The plan should describe: (1) a clear and concise definition of the data service to be provided; (2) the specific roles and responsibilities of the PI and other members of the team/network; (3) mechanisms for orderly change and adaptation to accommodate changes in technologies and the changing needs of the relevant communities; (4) means for effective communication and engagement with the relevant communities and stakeholders; (5) specific milestones including an expected 'go live' date; (6) selection of an approved open source license (see www.opensource.org) for distributing any software; and (7) mechanisms for assessing overall progress in meeting the needs of the community, including metrics to rigorously assess the effectiveness of the team/network in achieving community engagement.

All DIBBs teams/networks are expected to include participation of underrepresented groups. The inclusion of new researchers, post-docs, graduate students, and undergraduates in relevant activities is also encouraged.

International Participation: Networks should include international participants as a means of achieving global interoperability wherever that enhances the goals of the proposal. Activities of the international partners outside the U.S. must be supported by funds from their own sources and programs.

III. AWARD INFORMATION

Anticipated Funding Amount: Up to \$41,500,000, pending availability of funds; the average award size for conceptualization awards is anticipated to be \$100,000 for one year; the average award size for implementation awards is anticipated to be approximately \$8 million total over 5 years; the award size for interoperability awards is anticipated to be up to \$1.5 million total over 3 years.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

PI Limit:

PIs and Co-PIs may only apply to one of the three tracks, although they may be senior personnel on more than one.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 1

PIs and Co-PIs may only apply to one of the three tracks, although they may be senior personnel on more than one.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program 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 nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program 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.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

Proposals must be received as a single submission with one organization serving as the lead and all others as subawardees. Linked proposals submitted using the collaborative mechanism of Fastlane will be returned without review. While the lead institution submitting the proposal must be a U.S. academic institution or U.S. non-profit, non-academic organization, subawardees may be any entity eligible under the provisions of the NSF GPG.

Title - Title begins with "CIF21 DIBBs".

Project Summary (1 page) - Provide a summary description of the DIBBs project, including its transformative research and education goals, the innovative data infrastructure being proposed, and the community (communities) that will be impacted. In separate statements, provide a succinct summary of the intellectual merit and broader impacts of the proposed project. **Full proposals that do not address the intellectual merit and broader impacts of the proposed project in separate statements will be returned without review.**

Project Description - For conceptualization awards the project description is limited to 5 pages. For implementation and interoperability awards the project description is limited to 15 pages. For all three tracks, the project description must address the following:

- Vision and Rationale - Describe why the data infrastructure building block is needed, what new opportunities in science and engineering research it would enable, how it relates to and supports other cyberinfrastructure components, and its anticipated impact on discovery and learning. Provide the rationale for the choice of science and engineering research and education communities to be served. Describe the nature of the anticipated user base. Explain how the vision and rationale contribute to an effective business model for achieving long term economic and technological sustainability.
- Activities - Describe the research, education and training plans as well as their integrative components. Describe plans for obtaining active user input. Provide plans for developing and, appropriate to the track, implementing a vigorous and comprehensive assessment and evaluation program.
- Management - Describe the organizational structure of the proposed team and a management plan with a diagram of reporting relationships and an outline of how the various project components interact and are brought together into a functional whole. List the types of expertise to be provided by project personnel and partners. Describe the various sectors (e.g. academic, government, non-profit, commercial, international, etc.) to be involved and how each contributes to and benefits from the project. Provide plans for increasing the participation of women and individuals from underrepresented groups.
- Results from Prior Research - Describe only prior research of the PI or Co-PIs funded by NSF that is directly and immediately relevant to this proposal.

References Cited - Indicate with an asterisk any cited publications resulting from prior research funded by NSF for the PI or Co-PIs when following the guidelines for all references cited.

Biographical Sketches - Provide biographical sketches for the PI, Co-PIs, and other Senior Personnel listed on the Project Summary page.

Current and Pending Support - Provide this information for the PI, Co-PIs and other senior personnel listed on the Project Summary page.

Budget - Follow the instructions in the GPG or NSF Grants.gov Application Guide for preparing the budget. Multi-institutional proposals must be submitted through the lead organization with a single budget including all other participating organizations as subawardees (see GPG guidelines, Chapter II.D.3). Provide a detailed budget justification separately for the lead organization (up to 3 pages) and for each subawardee budget (up to 3 pages each). Funds for facility construction or renovation may NOT be requested. Participation in the DIBBs annual meeting will be a requirement of an award. Funds for travel by up to two project personnel to this annual meeting at NSF in Arlington, Virginia must be included in the budget. Implementation and Interoperability proposal budgets should also include travel funds for the PI to attend an annual reverse site visit at NSF in Arlington, Virginia.

Special Information and Supplementary Documentation -

Implementation and Interoperability proposals may include in supplementary documents a 1-page system design diagram specifying all critical components, including hardware and/or software and any necessary dependencies affecting system use by the scientific community. The diagram should be referenced in the Project Description.

Single Copy Documents: The following information is required in addition to that included within the provisions of the GPG or NSF Grants.gov Application Guide:

Integrated Conflicts of Interests List for Applicants: Upload a file in CSV "flat text" format (e.g., by saving an Excel spreadsheet as a CSV file), which lists the full names and institutional affiliations of all people having potential conflicts of interest (COI) with any PIs, Co-PIs, and other senior personnel (SP). Potential conflicts of interest, as specified in the NSF's Grant Proposal Guide, include coauthors/editors and collaborators (within the past 48 months), all graduate advisors and advisees, and any other individuals or institutions with which the investigator has financial ties. The columns of the spreadsheet should be "PI/SP Last Name", "PI/SP First Name", "PI/SP Institution", "COI Last Name", "COI First Name", "COI Institution". Each project participant should be listed (repeatedly) in all rows that name his/her conflicted individuals. This list will be used by NSF to check for conflicts of interest in assembling the review community.

In addition to the Conflict of Interest List, other correspondence to the program not intended to be sent to reviewers, such as a list of potential reviewers, can be sent through the Single Copy Document section of FastLane or Grants.gov. Please note that key project personnel may be required, prior to an award decision, to submit copies of any intellectual property agreements or material transfer agreements they have signed, or are planning to sign, that would have an impact on the unrestricted and timely distribution of the outcomes of the NSF funded research. Submission of a Single Copy Document will allow these materials to be reviewed by the NSF officials only, and they will remain confidential.

Checklist for Proposal Preparation

Proposal submitted as a single proposal with one organization as the lead and all other participating organizations as subawardees. No linked, collaborative proposal submissions will be accepted.

Title begins with "CIF21 DIBBs".

Project Summary contains all requested information, including the broader impacts of the proposed work

Project Description is 15 (full) pages or less in length, including figures and tables

References Cited includes publications resulting from prior research funded by NSF (marked*)

Biographical Sketches (2 pages each) included for PI, Co-PIs, and Senior Personnel listed in the Project Summary

Current and Pending Support Statements included for PI, Co-PIs and Senior Personnel listed in the Project Summary

Budget Funds for travel by up to two project personnel to this annual meeting at NSF in Arlington, Virginia are included in the budget. Implementation and Interoperability proposal budgets also include travel funds for the PI to attend an annual reverse site visit at NSF in Arlington, Virginia.

Conflicts of Interest are included in a single, spreadsheet uploaded into Single Copy Documents

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

C. Due Dates

- Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):
 - July 26, 2012
 - Conceptualization Track
 - August 30, 2012
 - Implementation & Interoperability Tracks

D. FastLane/Grants.gov Requirements

- For Proposals Submitted Via FastLane:

Detailed technical instructions regarding the technical aspects of 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 solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

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. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. 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 the reviewer 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, original, or potentially transformative 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?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

Additional Solicitation Specific Review Criteria

In all three tracks proposals will be evaluated in part on how effective the proposed plan will be in: (a) meeting well-defined, critical data needs; (b) creating new opportunities and capabilities for discovery, innovation and learning; (c) improving the way science and engineering research and education are conducted; and (d) addressing the need for long term economic and technological sustainability beyond the end of NSF funding.

Proposals in the implementation and interoperability tracks will also be assessed on how effective the plan will be in: (a) addressing multiple stages in the full data management life cycle; (b) developing new tools and capabilities for learning that integrate research and education; (c) providing for community input and participation in all phases; and (e) ensuring vigorous and comprehensive evaluation and assessment of all aspects of the project.

Proposals in the implementation and interoperability tracks will also be assessed on how effective the plan described in the proposal is in: (a) providing the required cyberinfrastructure resources and capabilities; (b) enhancing the value of existing cyberinfrastructure capabilities or services to the community; (c) providing an appropriate range of expertise in cyberinfrastructure, library and archival sciences, computer and information sciences, and domain sciences; (d) serving a diverse user base; (e) ensuring active participation by a diverse range of individuals (including women and members of underrepresented groups), organizations, and sectors; (f) serving as an effective partner in an interoperable network of organizations; and (g) providing a management plan for effective leadership with clear lines of authority, responsibility, accountability, community and user responsiveness, and the ability to adapt to new opportunities and technologies.

NSF staff also 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.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review 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.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. 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 deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's 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 Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program 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.B. 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 (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. 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. Such reports provide information on activities and findings, project participants (individual and organizational), 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. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Robert Chadduck, telephone: 703-292-8970, email: rchadduc@nsf.gov
- Mimi McClure, telephone: (703) 292-5197, email: mmcclure@nsf.gov
- Dane Skow, telephone: (703) 292-4551, email: dkow@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised

of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

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: nspfubs@nsf.gov
 - or telephone: (703) 292-7827
- To Locate NSF Employees: (703) 292-5111


PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and 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 proposer 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 or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; 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," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). 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 Office of Management and Budget (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 the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

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	The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 TDD: (800) 281-8749					Last Updated: 11/07/06 Text Only