Big Data Regional Innovation Hubs (BD Hubs)
Accelerating the Big Data Innovation Ecosystem

PROGRAM SOLICITATION
NSF 15-562

National Science Foundation

Directorate for Computer & Information Science & Engineering

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

   June 24, 2015

IMPORTANT INFORMATION AND REVISION NOTES

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

   Big Data Regional Innovation Hubs (BD Hubs)
   Accelerating the Big Data Innovation Ecosystem

Synopsis of Program:

   In March 2012, the Administration announced the National Big Data Research and Development Initiative, which aims to solve some of the Nation's most pressing R&D challenges related to extracting knowledge and insights from large, complex collections of digital data. As part of this initiative, the Administration encouraged multiple stakeholders including federal agencies, private industry, academia, state and local governments, non-profits, and foundations, to develop and participate in Big Data research and innovation projects across the country.

   To augment ongoing activities and to ignite new Big Data public-private partnerships across the Nation, NSF's Directorate for Computer and Information Science and Engineering (CISE) is seeking to establish a National Network of *Big Data Regional Innovation Hubs* (BD Hubs). Each BD Hub would be a consortium of members from academia, industry, and/or government. This solicitation aims to establish four Hubs across distinct geographic regions of the United States, including the Northeast, Midwest, South, and West, as defined later in the Program Description section. Each BD Hub should focus on key Big Data challenges and opportunities for its region of service. The BD Hubs should aim to support the breadth of interested local stakeholders within their respective regions, while members of a BD Hub should strive to achieve common Big Data goals that would not be possible for the independent members to achieve alone.

   To foster collaboration among prospective partners within a region, NSF is sponsoring a series of regional, intensive, one-day workshops (called "charrettes"). One charrette will be held in each geographic region to convene stakeholders, explore Big Data challenges, and aid in the establishment of that consortium. For more information on these charrettes, see the following webpage: http://www.usenix.org/BDHubs15. To facilitate discussion among interested parties, a HUBzero community portal has been established at http://bdhub.info. Interested parties may leverage this portal to communicate with members within their region or other stakeholders nationwide.

   This solicitation is the first of a multi-phase process meant to develop a National Network of BD Hubs. The first phase will set up the governance structure of each BD Hub's consortium of members as well as develop approaches to ensure cross-hub collaboration and sustainability over the long term. The next phase will focus on building out various sectors of particular interest to each BD Hub (e.g., transportation, smart cities, health, energy, public safety, and education) so as to advance sector innovation in that region. The final phases will focus on connecting the BD Hubs and their regional sectors into a national Big Data innovation ecosystem.

   This solicitation is part of NSF's Big Data program, which includes: research and infrastructure development; education and workforce development; and multi-disciplinary collaborative teams and communities that address complex science and engineering grand challenges. Before preparing a proposal in response to this or any other Big Data solicitation, applicants are strongly encouraged to review those solicitations and consult with cognizant NSF program officers to determine appropriateness of fit. For example, this solicitation funds the establishment and coordination of a BD Hubs National Network, but is not meant to be a source of funding for new research. By contrast, the BIGDATA solicitation may be more relevant for research funding.

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.

- Fen Zhao, Staff Associate, telephone: (703) 292-7344, email: fzhao@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4

One award per region is anticipated.

Anticipated Funding Amount: $4,000,000 to $5,000,000

Each project will be funded up to a maximum of $1,250,000 for up to 3 years, subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

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.
- State and Local Governments: State educational offices or organizations and local school districts.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

An organization may only submit one proposal. This limit holds across all regions defined in the Program Description.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may only serve as the PI or co-PI in at most one submission. In the event that an individual exceeds this limit, proposals received within the limit will be accepted based on the earliest date and time of proposal submission. Any other submissions will be returned without review. **No exceptions will be made.**

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required

- **Preliminary Proposal Submission:** Not required

- **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):

  June 24, 2015

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.

TABLE OF CONTENTS

I. INTRODUCTION

The White House Office of Science & Technology Policy (OSTP), in concert with several federal departments and agencies, established the National Big Data R&D Initiative in 2012 to help address some of the Nation's most pressing challenges related to extracting knowledge and insights from large, complex collections of digital data. Under the initiative's first phase, six departments and agencies announced more than $200 million in new research and development investments.

Beginning in the second year of the initiative, the Administration encouraged multiple stakeholders, including federal agencies, private industry, academia, state and local governments, non-profits, and foundations, to develop and participate in Big Data innovation projects across the country. On November 12, 2013, dozens of public and private organizations met at a White House-sponsored "Data to Knowledge to Action" event to announce an inspiring array of Big Data-related collaborations (see http://www.whitehouse.gov/sites/default/files/microsites/ostp/Data2Action%20Press%20Release.pdf)

To sustain the forward momentum of the "Data to Knowledge to Action" event, NSF's Directorate for Computer and Information Science and Engineering (CISE) is seeking to establish a national network of "Big Data Regional Innovation Hubs" (BD Hubs). The overarching vision for this network of hubs is to create an agile and sustainable national Big Data innovation ecosystem that enables the United States to better leverage Big Data technologies and techniques in addressing societal challenges; increasing productivity and spurring economic development; enhancing scientific discovery; and providing for national defense and security.

II. PROGRAM DESCRIPTION

The BD Hubs are meant to stimulate regional and grassroots partnerships focused on Big Data, such as the partnerships launched at the Data to Knowledge to Action event referenced above, and give rise to a national Big Data innovation ecosystem. Proposals submitted in response to this BD Hubs solicitation should be from organizations that are currently engaged in Big Data innovation activities. These organizations should have a history of leading or fostering collaborations among multiple Big Data stakeholders and must be ready to build further partnerships. This solicitation will support the formation and coordination of a BD Hubs National Network and is not meant to be a primary source of funding for new research.

NSF seeks to fund up to four BD Hubs in four defined geographic regions, namely the Northeast, Midwest, South, and West, of the

United States. The regional breakdown of US states and the District of Columbia is as follows (adapted from
https://www.census.gov/econ/census/help/geography/regions_and_divisions.html):

NORTHEAST: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont;

MIDWEST: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin;

SOUTH: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and

WEST: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Representation from stakeholders in US territories not listed above is welcome and encouraged in proposals for any region. Identification of such an organization with an appropriate region is at the discretion of that organization, as organizations may define regions differently and/or operate within multiple regions.

To foster collaboration among prospective partners within a region, NSF is sponsoring a series of regional, intensive, one-day workshops (called "charrettes"). One charrette will be held in each geographic region to convene stakeholders, explore Big Data challenges, and aid in the establishment of that consortium. For more information on these charrettes, see the following webpage: http://www.usenix.org/BDHubs15. To facilitate discussion among interested parties, a HUBzero community portal has been established at http://bdhub.info. Interested parties may leverage this portal to communicate with members within their region or other stakeholders nationwide.

Each BD Hub should focus on key challenges and opportunities in its region of service. Opportunities could include facilitating partnerships on overarching themes (e.g., privacy, data sharing, data stewardship, etc.), providing shared resources to the community (e.g., tools, infrastructure, testbeds, etc.) and/or coalescing around key topical themes (e.g., energy, transportation, healthcare). Potential activities for BD Hubs include, but are not limited to:

- Accelerating the ideation and development of Big Data solutions to specific regional and/or societal challenges by convening stakeholders across sectors to partner in results-driven programs and projects;
- Driving successful pilot programs for emerging Big Data technology by acting as a matchmaker between the various academic, industry, and community stakeholders;
- Engaging stakeholders across the region, based on shared interests and industry sector engagement, to enable dialogue and share best practices, and to set standards for data access, data formats, metadata, etc.;
- Increasing the speed and volume of technology transfer between universities, public and private research centers and laboratories, large enterprises, and small and medium-sized businesses;
- Providing data resources of critical importance to the region such as a data steward or public trust service that validates and certifies privacy-sensitive data sets, infrastructure or other testbeds for small scale experimentation, and/or data tools relevant to the analysis needs of stakeholders; and
- Facilitating engagement with opinion and thought leaders on the societal impact of Big Data technologies as to maximize positive outcomes of adoption while reducing unwanted consequences. Topical examples could include privacy or broadening participation.

The proposed BD Hub should aim to establish 20-30 new partnerships during the award period.

Each proposal must also foster efforts to educate and train the Big Data workforce in its region, such as data scientists, business managers, students, and end users. Example efforts could include, but are not limited to, new data science curricula, educational workshops open to the region, and hackathons or other competitions focusing on one or more Big Data challenge(s).

BD Hub proposals should describe explicit mechanisms for creating and fostering collaborations in their regions. Vehicles for such collaboration may include creation of seminar series (with ability for remote presentations and participation); regional working groups; and "visitor" and other exchange programs to cross-pollinate collaborations and activities across organizations.

Fostering of a sustainable innovation ecosystem is critical to a successful BD Hub. Each proposal must therefore address the sustainability of the BD Hub in the long term.

The proposing institution must establish a steering council. The steering council should consist of unpaid representatives from a subset of the organizations who are actively involved in the governance and agenda setting for the regional consortium as a whole. The composition of the steering council is encouraged to be representative of the diversity of interests in the proposed BD Hub's membership, while also considering representation from underrepresented groups. It is anticipated that key decisions about a BD Hub's activities will be made by its steering council. Additional organizations may also choose to partner with the BD Hub on specific activities, both at the BD Hub inception and/or during the period of a BD Hub award. These so-called 'project partners' need not be members of the steering council if their focus is primarily on the specific activity rather than on the governance of the BD Hub. Project partners need not be located within a region to be engaged in the corresponding consortium, given that many organizations have a national scope and will therefore span multiple regions. However, the activities of a BD Hub are meant to support the unique data innovation challenges of the region it represents.

In addition, the proposing organization must establish a full-time, paid executive director position along with associated staff positions. These individuals will implement the decisions of the steering council and oversee day-to-day operations of the BD Hub.

The proposing organization should provide fiscal and implementation oversight to the BD Hub to ensure that BD Hub activities go forward in a way that addresses the interests of Big Data stakeholders in the region.

This solicitation is the first of a multi-phase process meant to develop a National Network of BD Hubs. The first phase will set up the governance structure of each BD Hub's consortium of members as well as develop approaches to ensure cross-hub collaboration and sustainability over the long term. The next phase will focus on building out various sectors of particular interest to each BD Hub (e.g., transportation, smart cities, health, energy, public safety, and education) so as to advance sector innovation in that region. The final phases will focus on connecting the BD Hubs and their regional sectors into a national Big Data innovation ecosystem.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant

Estimated Number of Awards: 4

One award per region is anticipated.

Anticipated Funding Amount: $4,000,000 to $5,000,000

Each project will be funded up to a maximum of $1,250,000 for up to 3 years, subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

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.
- State and Local Governments: State educational offices or organizations and local school districts.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

An organization may only submit one proposal. This limit holds across all regions defined in the Program Description.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may only serve as the PI or co-PI in at most one submission. In the event that an individual exceeds this limit, proposals received within the limit will be accepted based on the earliest date and time of proposal submission. Any other submissions will be returned without review. **No exceptions will be made.**

Additional Eligibility Info:

NSF welcomes collaborative proposals that include for-profit organizations. **However, for-profit organizations may only participate as subawardees.**

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.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the GPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that

the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The following instructions supplement guidance in the GPG:

Proposal Titles: Proposal titles must take the form **BD Hubs:REGION:Title**, where **REGION** is replaced by the region of service for the proposed Hub (e.g., a Hub proposed for the South region would have the title **BD Hubs:SOUTH:Title**). Titles of collaborative proposals should be prepared in a similar manner, but should also include "Collaborative Proposal" immediately after BD Hubs. Thus, the title of each proposal for a collaborative set of proposals would be **BD Hubs:Collaborative Proposal:**, followed by the region and actual title.

The regional breakdown of US states and the District of Columbia is as follows (adapted from https://www.census.gov/econ/census/help/geography/regions_and_divisions.html):

NORTHEAST: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont;

MIDWEST: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin;

SOUTH: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and

WEST: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Representation from stakeholders based in US territories not listed above is welcome and encouraged in proposals for any region. Identification of such an organization with an appropriate region is at the discretion of that organization, as organizations may define regions differently and/or operate within many regions.

Project Summary (1-page limit, 4,600 characters in total for all three text boxes): At the top of the Overview text box, enter the title of the BD Hubs project, the name of the PI and the lead institution. Provide a summary description of the BD Hubs project, including its Big Data focus areas and education goals, the stakeholders and geographical region involved, and the community (communities) that will be impacted by the BD Hub. In the separate text boxes, 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 within the project summary will be returned without review.** All project summaries must include a list of three to six keywords at the end of the broader impacts text box.

Project Description: There is a 15-page limit for the project description. The project description should clearly identify the goals of the proposed BD Hub and detail a set of measures and metrics for assessing success. It should also include a detailed timeline of activities for the first year and a preliminary timeline for the remaining years of the proposed project period. **The project description must also include a detailed collaboration plan, which describes the initial membership of the BD Hub, developed to ensure that the primary Big Data interests of the region are represented.** The project description must include descriptions of:

- Initial projects that will be implemented under the context of the BD Hub;
- The specific roles of the collaborating universities, industry partners, government agencies, non-profits and other organizations involved;
- The administrative and organizational structure of the BD Hub, including the steering council as well as any necessary advisory, administrative, and scientific support structures, and the BD Hub's relationship to the proposing organization;
- The specific coordination mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., workshops, graduate student exchanges, project meetings at conferences, use of videoconferencing and other communications tools, software repositories, regional working groups, community gatherings, etc.);
- Efforts the BD Hub will pursue to ensure collaboration with other funded BD Hubs;
- Plans for how the BD Hub will engage additional partners and how they may be incorporated into the BD Hub during the proposed project period;
- Specific references to the budget line items that support these coordination mechanisms; and
- How the BD Hub may become a sustainable resource for the region following the proposed project period (e.g., dues for members, additional funding sources, etc.).

In addition, the project description must explicitly state how the BD Hub's partnerships will support and enhance the education and training of the Big Data workforce for the region.

Supplementary Documents: Supplementary documents are limited to the specific types of documentation listed in the GPG, with a few exceptions, as specified below. **Any special information or supplementary documentation that has not been explicitly allowed in the GPG or this solicitation, such as article reprints or preprints, or appendices, will not be considered during the review process.**

a. **Data Management Plan.** Proposals **must** include as a supplementary document a Data Management Plan of no more than two pages. This supplement is provided in full by the lead institution. The Data Management Plan should describe how the project will manage its data and software and share its research results (including software). The Data Management Plan will be evaluated using NSF review criteria. Data management requirements and plans specific to the Directorate, Office, Division, Program, or other NSF unit, relevant to a proposal are available at http://www.nsf.gov/bfa/dias/policy/dmp.jsp. The plan may include information on:
      i. The types of data, software, curriculum materials, and other materials to be produced in the course of the project;
     ii. The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
    iii. Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
     iv. Policies and provisions for re-use, re-distribution, and the production of derivatives; and
      v. Plans for archiving data, samples, and other research products, and for preservation of access to them.
   Specific Data Management Plan guidance for proposals submitted to the CISE Directorate is available at http://www.nsf.gov/cise/cise_dmp.jsp.
b. **Letters of Collaboration.** Documentation of collaborative arrangements of significance to the proposal through letters of collaboration should be included (see GPG Chapter II.C.2.d.(iv) for details). All letters of collaboration must provide specific information regarding the collaboration, including whether it involves sharing resources (data, access to computational resources, or use of other equipment), time and effort, etc. No other type of letter can be provided. The lead institution provides the letters of collaboration.
c. **Postdoctoral Mentoring Plan.** This one-page supplementary document, describing how postdoctoral researchers will be mentored, **is required of all proposals that will provide funding to postdoctoral researchers**. The lead institution

provides this mentoring plan for the entire project. Reviewers will be asked to review the mentoring plan, as appropriate.

d. **A list of Project Personnel and Partner Organizations** (note: in collaborative proposals, only the lead institution should provide this information.). Provide current, accurate information for all personnel and organizations involved in the project. NSF staff will use this information in the merit review process to manage conflicts of interest. The list must include all PIs, Co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, project-level advisory committee members, and writers of letters of support. This list should be numbered and include (in this order) Full name, Organization(s), and Role in the project, with each item separated by a semi-colon. Each person listed should start a new numbered line. For example:

1. Mary Smith; XYZ University; PI
2. John Jones; University of PQR; Senior Personnel
3. Jane Brown; XYZ University; Postdoc
4. Bob Adams; ABC Inc.; Paid Consultant
5. Mary White; Welldone Institution; Unpaid Collaborator
6. Tim Green; ZZZ University; Subawardee

Proposals that are missing required supplementary documents as specified above will be returned without review.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

It is expected that appropriate senior personnel (including PI and co-PIs as appropriate) from each funded project will attend an annual national meeting of all funded BD Hubs to present their activities, foster collaboration between regions, and discuss broader impacts. Proposals should budget for these individuals to attend this annual meeting, including funds for travel and subsistence for this event.

C. Due Dates

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

  June 24, 2015

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions 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.

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://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at:
http://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

NSF reviewers will address the degree to which the proposed Hub will:

1. Address the unique challenges and opportunities of its region that would not be possible for independent members acting alone;
2. Include the breadth of stakeholders within its region;
3. Aid the education and training of the Big Data workforce as well as related external groups such as end users, students, or managers; and
4. Demonstrate a strategy for becoming a sustainable long-term resource for the region.

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 evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. 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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

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 notice, 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 notice; (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 notice. 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

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 prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following 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 all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also 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.

More comprehensive information on NSF Reporting Requirements 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.

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:

- Fen Zhao, Staff Associate, telephone: (703) 292-7344, email: fzhao@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, "NSF Update" is an information-delivery system 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 Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this 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**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

      Send an e-mail to: nsfpubs@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
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

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