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Centers for Chemical Innovation (CCI)
Chemistry as the Driver for Transformative Research and Innovation

PROGRAM SOLICITATION
NSF 13-590

REPLACES DOCUMENT(S):
NSF 12-572

National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Chemistry

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

November 21, 2013

for eligible Phase II proposals

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Centers for Chemical Innovation (CCI)
Chemistry as the Driver for Transformative Research and Innovation

Synopsis of Program:

The Centers for Chemical Innovation (CCI) Program supports research centers focused on major, long-term fundamental chemical research challenges. CCIs that address these challenges will produce transformative research, lead to innovation, and attract broad scientific and public interest. CCIs are agile structures that can respond rapidly to emerging opportunities and make full use of cyberinfrastructure to enhance collaborations. CCIs may partner with researchers from industry, government laboratories and international organizations. CCIs integrate research, innovation, education, and informal science communication and include a plan to broaden participation of underrepresented groups.

The CCI program is a two-phase program, but only Phase II will be offered in FY 2014. Only organizations receiving Phase I awards in FY 2011 and renewals of Phase II CCIs initiated in FY 2009 are eligible to request Phase II funding in FY 2014.

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.

- Katharine Covert, Program Director, telephone: (703) 292-4950, fax: (703) 292-9037, email: kcovert@nsf.gov

- Zeev Rosenzweig, Program Director, telephone: (703) 292-7719, email: zrosenzw@nsf.gov

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

- 47.049 --- Mathematical and Physical Sciences

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 2 In FY 2014, NSF anticipates making up to 2 new/renewal Phase II awards (up to $4,000,000/yr for five years, renewable once for a total of 10 years), pending availability of funds and submission of sufficient quality proposals.

Anticipated Funding Amount: $8,000,000 In FY 2014, pending availability of funds and submission of sufficient quality proposals.

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:

While these proposals will reflect the research of many investigators, only the name of the PI should appear on the cover sheet. All other investigators are considered senior personnel. An investigator may participate (as PI or senior personnel) in only one CCI proposal submitted to this competition. The PI must be affiliated with an eligible submitting organization.

Limit on Number of Proposals per Organization:

None Specified

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

Only one proposal per eligible PI.

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:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

    November 21, 2013

      for eligible Phase II proposals

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

The Centers for Chemical Innovation (CCI) Program supports research centers focused on major, long-term fundamental chemical research challenges. CCIs that address these challenges will produce transformative research, lead to innovation, and attract broad scientific and public interest. CCIs are agile structures that can respond rapidly to emerging opportunities and make full use of cyberinfrastructure to enhance collaborations. CCIs may partner with researchers from industry, government laboratories and international organizations. CCIs integrate research, innovation, education, and informal science communication and include a plan to broaden participation of underrepresented groups.

II. PROGRAM DESCRIPTION

CCI awards support the formation and development (Phase I) or sustained funding (Phase II) of research centers that can address major research challenges in fundamental chemistry. Successful centers will tackle challenges of large scope and impact, producing transformative research leading to innovation and enhanced economic competitiveness. CCI awards will bring researchers with shared and complementary interests into productive contact to nurture a culture of risk-taking and innovation.

In FY 2014, the Division of Chemistry is considering only eligible Phase II CCI proposals. Only organizations receiving Phase I awards in FY 2011 and renewals of Phase II CCIs initiated in FY 2009 are eligible to request Phase II funding in FY 2014.

CCIs may partner with researchers from industry, national laboratories and international organizations. See detailed guidance below for non-U.S. or non-academic researchers.

CCIs are expected to integrate their research with activities that broaden the impact of their research. The following integrative elements are required throughout the lifetime of a CCI award:

- Innovation - translation or transfer of basic research results into social or economic benefit. This element includes intellectual property protection and a proactive plan to either engage industry in technology transfer or to commercialize technology in other ways.
- Education and Professional Development - education and professional development for undergraduate and graduate students supported by the grant, including co-mentorship or other collaborative training. Continued professional development and mentoring for postdoctoral research associates. Education in various aspects of innovation (intellectual property, entrepreneurship, etc.). Other education activities (i.e., new course materials or curricula) that affect the university or universities involved in the CCI.
- Broadening the participation of underrepresented groups - CCI goals for increasing diversity, plans for reaching those goals, and an evaluation strategy.
- Informal science communication - plans for communicating the CCI research to public audiences and possible ways to

evaluate the impact of these outreach efforts.

- Management - effective management plans include careful evaluation of the research and integrative elements, allocation of resources, the ability to initiate new lines of research and terminate support for less effective ones, and to promote communication throughout the center and with partners.

Investigators are strongly urged to contact a cognizant Program Officer (listed in Section VIII of this solicitation) when considering submitting a proposal.

CCIs may partner with researchers from industry or government laboratories. CCIs are encouraged to develop collaborations that involve sending U.S. students and junior researchers to conduct collaborative research with non-academic partners and to host non-academic researchers for research visits at CCI sites. No grant funds may be subawarded to industry or government laboratories. These team members must be supported by their own organization. Federal employees may not receive salaries or in other ways augment their agency's appropriation through grants made by this program, and no funds for major equipment at Federally Funded Research and Development Centers (FFRDCs) are allowed. However, it is appropriate for students and postdoctoral researchers supported through universities to work at a partner industrial laboratory, FFRDC or comparable site, or for universities to fund research expenses incurred when scientists from such entities work at university sites. Industrial and government partners will provide a letter of collaboration in the supplementary documents section of the Phase II full proposal.

CCIs may also partner with researchers from international organizations. CCIs are encouraged to develop collaborations that involve sending U.S. students and junior researchers to conduct collaborative research at international partner organizations. NSF awards are normally limited to support of the U.S. portion of the collaboration. Although reciprocal visits by international researchers and students to the U.S. institutions are encouraged, NSF will not usually pay for the expenses of foreign scientists or students undertaking such visits. However, for projects involving exchanges of researchers and/or students, reciprocal arrangements are encouraged, with adherence to the overall principle that each side supports equivalent costs. No grant funds may be subawarded to international organizations. In CCI projects where collaborators are scientists and engineers from a developing country or from a country whose currency is not convertible, limited funds may be requested to support their participation in the project; proposers should consult with the OIIA program officer(s) responsible for the country(ies) in question (http://www.nsf.gov/od/oise/country-list.jsp.) International partners will provide a letter of collaboration in the supplementary documents section of the Phase II proposal.

Principal Investigators should ensure that their proposed project does not substantially overlap with ongoing federally-funded research. Proposals submitted in response to this solicitation may be shared with other Federal agencies, including (but not limited to) the Department of Energy, National Institutes of Health, Air Force Office of Scientific Research, Office of Naval Research, and the Intelligence Community. Reviews, including panel summaries, if applicable, may also be shared. The reasons for sharing these proposals and reviews include potential co-funding as well as avoiding duplication of Federal funding for a particular research project. If the PI or awardee organization does not wish the proposal to be shared with a particular Federal agency or agencies, they should provide a Single Copy Document with the proposal stating which Federal funding agencies should be excluded. No explanations for exclusion are required.

III. AWARD INFORMATION

NSF anticipates making up to 2 new/renewal Phase II awards (up to $4,000,000/yr for five years, renewable once for a total of 10 years), pending availability of funds and submission of sufficient quality proposals.

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:

While these proposals will reflect the research of many investigators, only the name of the PI should appear on the cover sheet. All other investigators are considered senior personnel. An investigator may participate (as PI or senior personnel) in only one CCI proposal submitted to this competition. The PI must be affiliated with an eligible submitting organization.

Limit on Number of Proposals per Organization:

None Specified

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

Only one proposal per eligible PI.

Additional Eligibility Info:

Only organizations receiving Phase I awards in FY 2011 and renewals of Phase II CCIs initiated in FY 2009 are eligible to request Phase II funding in FY 2014. No CCI funds may be awarded or subawarded to industry or government laboratories or international organizations.

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/bfa/dias/policy/docs/grantsgovguide.pdf). 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.

Important Proposal Preparation Information: FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Phase II Proposals

CCI Phase II proposals submitted in response to this program solicitation must originate from (a) teams whose projects have been supported by a CCI Phase I award (FY2011-FY2013) or (b) Phase II awards initiated in FY 2009 and seeking renewal. The Phase II proposal must be based on those previously-funded projects. Proposals not meeting this requirement will be returned without review.

Proposal authors are strongly encouraged to consult the proposal submission checklist included in the Grant Proposal Guide (GPG) as they prepare their proposal. Proposals not compliant with the proposal preparation guidelines, as supplemented by the following instructions, will be returned without review.

The items outlined below pertain to the corresponding sections in the GPG.

Project Summary. One page limit, including the names and affiliations of all senior personnel. The project summary must provide an overview and address both the intellectual merit and broader impacts of the proposed Phase II Center.

Project Description. A total of up to 35 pages (40 pages for renewing Phase II CCIs), as described below:

- Prior Support. Report on the results from the CCI Phase I program (5 pages) or from the initial period of Phase II (10 pages; for Phase II projects seeking renewal). No results from other prior support should be included.
- Proposed CCI Research, 20 pages, consisting of the following items:
    - An explanation of the scientific context, intellectual merit, relevance to chemistry and timeliness of the proposed Center;
    - A justification of the need for a Phase II CCI;
    - A description of the contribution to be made by each senior investigator; and
    - A description of the proposed research
- Integrative CCI Components, including discussion of how these activities will be integrated with the research and other activities of the CCI:
    - Plan for innovation, not to exceed 2 pages, that includes:
        - Identification of promising research from the CCI's research portfolio that can and will be translated into innovations;
        - Identification of university and external resources, expertise, and stakeholders, as well as other potential allies to aid in the translation of the research to innovations;
        - Discussion of how intellectual property will be developed and managed;
        - Summary of the innovation plan including goals, intended outcomes, resources required to validate need for the intended innovation and translation options; and
        - Plans for monitoring and evaluating efficacy of the plan for innovation.
    - Plan for education and professional development, not to exceed 2 pages, describing:
        - The education and professional development plan for undergraduate and graduate students, including co-mentorship or other collaborative training;
        - Plans for education in various aspects of innovation;
        - Plans for monitoring and evaluating efficacy of the plan for education and professional training; and
        - Role of postdoctoral researchers. (Note: 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.)
    - Plan for broadening participation by underrepresented groups, not to exceed 2 pages, describing:
        - The broadening participation goals to be addressed;
        - Plans for achieving those goals, including explanation of resources to be used and how these efforts are anticipated to improve on your current diversity; and

Plans for monitoring and evaluating efficacy of the plan for broadening participation by members of underrepresented groups.

- Plan for informal science communication, not to exceed 2 pages, describing;
  - Plans to disseminate the results of the Center's work and achievements to a broader public audience;
  - Plans to increase the visibility and public appreciation of chemistry;
  - Any partnerships with informal science organizations; and
  - Plans for monitoring and evaluating efficacy of the plan for public science communication.
- Plan for Center management, not to exceed 2 pages, describing:
  - How the research and integrative components of the CCI will be monitored, evaluated and altered as needed;
  - How communication will be promoted throughout the Center and with partners;
  - How the Center effort and partnerships will be coordinated, including any use of cyberinfrastructure;
  - How decisions will be made regarding the conduct of the project, including plans for and responsibilities of advisory groups; and
  - A discussion of how agility will be addressed in terms of the incorporation of new ideas, tools, and partners.

An external advisory board will be required to provide guidance and advice to the CCI on all activities. Prospective members of the external advisory board should provide letters of commitment in the supplementary documents.

References Cited. References should include full titles of articles and book chapters cited. This section should include bibliographic citations only and must not be used to provide parenthetical information outside of the Project Description. Indicate with an asterisk (*) references from work on the CCI Phase I project or the first five years of a CCI Phase II.

Biographical Sketches. For PI and all senior personnel, provide brief biographical sketches using the format described in the GPG. Note that recent collaborators and other affiliates should also be collected into a combined list and submitted as a Single Copy Document (see below).

Budget. Include five annual budgets of up to $4,000,000, one for each year of the duration of the award; a cumulative budget will be automatically generated by FastLane. Multi-institutional proposals should use the award-sub award proposal mechanism. Subaward budgets should be included with this proposal, although proposers may, at their discretion, elect to submit detailed subaward budgets for only the first year of the requested award period. A detailed budget justification (up to 3 pages) should document proposed expenses.

Current and Pending Support. A full description of the total level of current and pending support from all sources for the PI and senior personnel. Intellectual overlap between any Federally funded projects or projects submitted for Federal funding and the proposed research must be clarified.

Facilities, Equipment & Other Resources. A description of the facilities (including laboratories, computational facilities, and cyberinfrastructure) that will be made available to the project. Separate facilities descriptions should be included for multi-institutional projects or those involving non-academic partners.

Supplementary Documents. Supplementary materials are available to reviewers and may include:

- Postdoctoral Mentoring Plan (required if requesting funds for postdoctoral researchers). See GPG for further guidance.
- Data Management Plan (required). See GPG for further guidance.
- Letters of collaboration, including those from industrial, government and/or international partners. Letters of commitment from members of proposed advisory boards. Letters of recommendation or general support are not permitted.
- Quotes for the purchase of instrumentation or other budget documentation.

Single Copy Documents. Single Copy Documents are used by NSF staff, but are not available to the reviewers. Single Copy Documents may include:

- Suggested Reviewers and Reviewers Not to Include (optional).
- A combined, alphabetized list of all scientists, with current affiliations, who have collaborated with the PI and other senior personnel in the last 48 months or are otherwise affiliated with these individuals. Other affiliations include advisers, mentors, graduate students, postdoctoral researchers, members of advisory boards, etc.
- If applicable, a statement excluding other Federal agencies from seeing your proposal and reviews.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Multi-institutional proposals should use the award-subaward mechanism discussed in the GPG, Chapter II.D.4. A single proposal and budget should be submitted, with subawards administered by the lead institution.

Budget Preparation Instructions:

Phase II CCI awards are up to $4,000,000 per year for five years. Phase II proposals should include funds in the budget for CCI personnel to participate in site visits or reverse site visits in the second and fourth years of the project.

C. Due Dates

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

  November 21, 2013

  for eligible Phase II proposals

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 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 *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. 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 core strategies 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 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 variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening 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

In addition to the National Science Board merit review criteria, reviewers will be asked to apply the following criteria when reviewing CCI proposals:

For Phase II proposals:

- Are the scientific goals ambitious and appropriate for a CCI Phase II?
- Does the project build upon novel and significant results achieved thorugh previous CCI funding?
- Does the proposal present a convincing argument that a Phase II Center will lead to transformative research in chemistry?
- Does the proposal present a convincing plan for innovation?
- Does the proposal present a convincing plan for education and professional training?
- Does the proposal present a convincing plan for broadening participation?
- Does the proposal present a convincing plan for informal science communication?
- Does the proposal present a convincing plan for center management? Will the management plan be effective in promoting effective and agile research teams with a high tolerance for risk?

Note that site visit reports and other information from previous award periods may be used in the review and recommendation of this proposal.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, Site Visit

Review, or Reverse Site Review.

CCI Phase II proposals are significant potential investments and receive thorough review. New Phase II proposals are reviewed using ad hoc review by technical experts followed by a reverse site visit. Renewal Phase II proposals are reviewed by ad hoc review by technical experts and then, at the Program Director's discretion, may go through additional review including a panel, site visit or reverse site visit as needed to inform the Program's recommendation regarding continued funding. Panel Reports from the previous grant period (CyberReview for new Phase II candidates, site visit reviews for renewing Phase IIs) are available to the review panel and inform their recommendations. These Panel Reports are also critical to the Program's recommendation.

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 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

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:

- Katharine Covert, Program Director, telephone: (703) 292-4950, fax: (703) 292-9037, email: kcovert@nsf.gov

- Zeev Rosenzweig, Program Director, telephone: (703) 292-7719, email: zrosenzw@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, "My NSF" 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. "My NSF" also is available on NSF's website at http://www.nsf.gov/mynsf/.

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**   (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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