

Research Coordination Networks: Fostering and Nurturing a Diverse Community of CI Professionals (RCN:CIP)

PROGRAM SOLICITATION NSF 22-558



National Science Foundation

Directorate for Biological Sciences

Directorate for Computer and Information Science and Engineering
Office of Advanced Cyberinfrastructure

Directorate for Education and Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical and Physical Sciences

Directorate for Social, Behavioral and Economic Sciences

Office of Integrative Activities

Office of International Science and Engineering

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

April 25, 2022

IMPORTANT INFORMATION AND REVISION NOTES

This solicitation follows the model set forth by, but does not replace, the [NSF 17-594](#) solicitation, titled "Research Coordination Networks (RCN)".

Innovating and migrating proposal preparation and submission capabilities from FastLane to Research.gov is part of the ongoing NSF information technology modernization efforts, as described in [Important Notice No. 147](#). In support of these efforts, research proposals submitted in response to this program solicitation must be prepared and submitted via Research.gov or via Grants.gov, and may not be prepared or submitted via FastLane.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 22-1](#)), which is effective for proposals submitted, or due, on or after October 4, 2021.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Research Coordination Networks: Fostering and Nurturing a Diverse Community of CI Professionals (RCN:CIP)

Synopsis of Program:

The national research cyberinfrastructure (CI) ecosystem is a key catalyst for discovery and innovation across research domains and plays a critical role in ensuring US leadership in science and engineering, economic competitiveness, and national security, consistent with NSF's mission. A diverse, skilled, capable, and productive workforce is required to effectively leverage and utilize current, emerging, and future CI capabilities – spanning researchers who use CI, developers of new CI capabilities, and professionals that deploy and operate NSF-supported CI. Developing and sustaining such a dynamic CI workforce presents challenges that are similar across science and engineering research and education fields, such as implementing effective institutional and on-the-job training and refreshing skills to keep up with evolving software, technologies, platforms, and application requirements ^[1]. The CI workforce also faces somewhat unique challenges due to lack of clear career pathways and disparity in position descriptions.

In this broader context, NSF envisions fostering and nurturing diverse communities of CI Professionals (CIP) across all areas of science and engineering research and education ^[2] by establishing a network of connected and coordinated hubs that recognize and connect CI Professionals, support communications, training, sharing of best practices, and mobility across projects and organizations.

To establish this network for all stakeholders of the CI workforce, NSF will support a set of Research Coordination Networks (RCN) to advance CI Professionals communities through transformative and/or new approaches for fostering, nurturing, expanding, and sustaining such communities. The RCN:CIP projects are intended to:

1. foster exchange and community development among CI Professionals;
2. share experience on sustaining and retaining CI Professionals;
3. raise the awareness and importance of CI Professionals in academia, and convey the information to academic leaders on their career development;
4. communicate opportunities for, and importance of, CI Professionals' collaboration with research and engineering groups;
5. advance best practices for recruiting and developing CI expertise at all levels;
6. explore mutually beneficial partnerships across the different stakeholders in academia, government, non-profits, and industry; and
7. explore the establishment and sustainability of a network of hubs over the longer term, including governance and coordination among these hubs.

The RCN:CIP will engage CI Professionals from across the NSF research and education community and will also include representatives from university leadership (e.g., Vice Presidents for Research) and industry. The RCN must maintain a website for dissemination of RCN information, including opportunities for participation. The RCN may be regional, focused on specific research disciplines, or a combination. A key goal, and metric of success, of the RCN investments will be broadening participation. Broad inclusion of minorities and underrepresented communities will be particularly important. RCNs focused on these communities, and/or well-suited opportunities for such institutions to open career paths for such individuals, are encouraged. Geographic diversity is an important consideration and proposals led by institutions in EPSCoR jurisdictions are encouraged. In addition, participation by key organizations and societies (such as ACM – Association for Computing Machinery, CASC - Coalition for Academic Scientific Computation, and CRA – Computing Research Association) will be important and is also encouraged.

NSF expects the RCN:CIP awardees to coordinate their efforts and activities, for instance through joint workshops and knowledge sharing, towards the goal of defining and establishing an interconnected network of hubs with a common set of high-level objectives and overall outcomes. RCN:CIP will be expected to implement a range of measures to demonstrate progress, efficacy, and improvements.

It is required that prospective PIs contact the RCN:CIP Program Officer(s) to ascertain if the focus and budget of their proposed RCN is appropriate for this solicitation.

References

[1] *Building the research innovation workforce: a workshop to identify new insights and directions to advance the research computing community*, <https://www.rcac.purdue.edu/ciworkforce2020>

[2] *Transforming Science Through Cyberinfrastructure: NSF's Blueprint for a National Cyberinfrastructure Ecosystem for Science and Engineering in the 21st Century: Blueprint for Cyberinfrastructure Learning and Workforce Development*, <https://www.nsf.gov/cise/oac/vision/blueprint-2019/CI-LWD.pdf>

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.

- Bogdan Mihaila, telephone: (703) 292-8235, email: bmihaila@nsf.gov
- Alan Sussman, telephone: (703) 292-7563, email: alasusm@nsf.gov
- Thomas Gulbransen, telephone: (703) 292-4211, email: tgulbran@nsf.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and the quality of proposals received. A RCN:CIP award is expected to be at the level of \$100,000 – \$200,000 per year with a duration of up to five years. Up to five awards are expected in FY 2022 depending upon the availability of funds and the quality of proposals received.

Anticipated Funding Amount: \$2,500,000 to \$5,000,000

A total RCN:CIP award for five years must lie in the range of \$500,000 to \$1,000,000, with \$100,000 – \$200,000 in FY 2022.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- 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.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

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 Research.gov: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - 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: https://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. submitter's local time):

April 25, 2022

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria 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 national research cyberinfrastructure (CI) has become critical to computational and data intensive research across all of science and engineering (S&E) in the 21st century. NSF has shared a vision ^[2] that calls for the broader availability and innovative use of an agile, integrated, robust, trustworthy, and sustainable CI ecosystem that can drive new thinking and transformative discoveries in all areas of S&E research and education. In that context, NSF emphasizes the importance of CI learning and workforce development (LWD) activities that span all relevant communities as well as their institutions. Fostering and nurturing a diverse, recognized, and skilled CI workforce is critical to accelerate and amplify the transformative impact of CI across all S&E research and education fields.

NSF recognizes the multifaceted nature of increasing the sustainability of CI Professional communities, that include research CI and professional staff who deploy, manage, and support the effective use of research CI. The broad CI Professional community includes the information technology professionals, scientists, and engineers who work closely with computational and data-enabled scientific and engineering researchers at colleges and universities, supercomputing and other centers, and research laboratories. Examples of CI Professionals include CI system administrators, CI research support staff, CI research software engineers, and CI facilitators, and may also include computational research scientists and engineers and non-tenure-track faculty. CI Professionals provide a broad spectrum of skills and expertise to the scientific and engineering research enterprise, whether for a single research project or a set of research projects, for a single department or campus or across multiple departments and campuses, or for a single scientific discipline or across multiple disciplines.

NSF encourages the self-organization of sustainable communities of CI Professionals through regional or discipline-centered collaborative networks. Following the well-established exemplar model set forth by the [Research Coordination Network \(RCN\) program](#), NSF seeks to advance the CI Professional communities' sustainability via interdependence, mutual interests, and shared value propositions.

II. PROGRAM DESCRIPTION

Support will be provided for groups of investigators to communicate and coordinate their efforts across disciplinary, organizational, institutional, geographical, and/or international boundaries. The objectives are to facilitate open communication and exchange of information and resources; to integrate research, education, and/or cyberinfrastructure activities of scientists, educators, and engineers working independently on topics with common interests; to nurture clearer recognition and a sense of community among the CI ecosystem's young scientists, educators, and engineers; and to minimize isolation and maximize cooperation so as to eliminate unnecessary duplication of efforts.

RCN:CIP proposals should focus on RCN goals and CI workforce challenges in a manner that balances social, technical, and institutional considerations to achieve well-connected, inclusive, vibrant, and sustainable communities that demonstrably advance science or engineering research. Proposals are expected, where applicable, to leverage ongoing NSF program investments in CI LWD. Similarly, proposals may highlight efforts to identify, and/or fill topical or geographical gaps in CI workforce LWD activities either topically or geographically. Consideration will be given to all well-justified, integrative proposals aiming to develop communities of CI expertise which will advance CI-driven research in a field or combination of fields under the purview of the NSF directorates and offices, or interdisciplinary networks that cross between directorates.

RCN:CIP proposals can be up to 5 years in duration with total budgets between \$500,000 and \$1,000,000. Investigators are required to contact the cognizant Program Officer(s) to discuss suitability of an RCN idea prior to submitting a proposal.

All RCN:CIP proposals must conform to the following guidance items:

1. *Topic/focus of CIP coordination.* RCN:CIP proposals should identify a clear theme as the focus of its activities. Proposals should spell out the theoretical and/or methodological foundations of the network's proposed activities, and should specify what questions will be addressed, what activities will be undertaken, what groups of investigators will be brought together in novel ways, what products will be generated by network activities, and how information about the network and opportunities to participate will be disseminated and gathered. The proposal should also outline the expected benefits of the network's activities in moving a field forward and the implications for the broader community of researchers and educators.
2. *Principal investigator (PI).* Although research coordination networks are expected to involve investigators from multiple sites, a single organization must serve as the submitting organization for each proposal. Of the two types of collaborative proposal formats described in the *Proposal and Award Policies and Procedures Guide (PAPPG)*, this solicitation allows only a single proposal submission with subawards administered by that lead organization. The PI is the designated contact person for the project and is expected to provide leadership in fully coordinating and integrating the activities of the network. Strong, central leadership and clear lines of responsibility are essential for successful networking.
3. *Steering committee.* Members of the steering committee will be network participants who assume key roles in the leadership and/or management of the project. The steering committee should be representative of the communities of participants that will be brought together through the RCN:CIP award, and who will recommend approaches to community governance in the future. It must include all co-PIs, if any are listed on the cover page of the proposal, and any other senior personnel, including any foreign collaborators involved as leaders or otherwise considered senior personnel. **Therefore, the steering committee constitutes all the senior personnel for the RCN:CIP proposal.** The name and home organization of each steering committee member should be listed in the project summary. As these individuals are all senior personnel, their Biographical Sketches and Current and Pending Support statements must be included in the appropriate sections of the proposal.
4. *Network participants.* The size of a network is expected to vary depending on the theme and the needs of the proposed activity. The network may be regional, national, or international. It is expected that a proposed network will involve investigators from organizations well-suited to achieve diversity, equity, and inclusion goals. The inclusion of new researchers, post-docs, graduate students, and undergraduates is encouraged. Specific efforts to increase participation of underrepresented groups (women, underrepresented minorities, and persons with disabilities) should be included. In the proposal, an initial network of likely participants should be identified. However, there should be clearly developed mechanisms to maintain openness, ensure access, and actively promote participation by interested parties outside of the initial participants in the proposed network.
5. *Coordination and management.* The proposal should include a clearly defined management plan. The plan should include a description of the specific roles and responsibilities of the PI and the steering committee. Mechanisms for allocating funds, such as support for the work of a steering committee, should be clearly articulated. The plan should include provisions for flexibility to allow the structure of the steering committee and participant group to change over time as membership and the network's foci evolve.
6. *Measures of Success.* Given the complex nature of the advanced CI ecosystem, its spectrum of participants, prospective members, and stakeholder institutions, a wide variety of methods can be applied to demonstrate progress and effectiveness in developing the RCN:CIP. Metrics for workforce involvement will require clear definitions and comparative baselines. Measures of communities' status and progress regarding technical readiness will likely depend on innovative methods to coherently represent requisite skills. Ability to measure progress advancing S&E research will depend heavily on value propositions to connect CI Professionals' unique contributions with research outcomes. Sustainability measures ought to reflect both resources needed, and sources thereof, to maintain the community, as well as indicators of the value provided to researchers and institutional sponsors.
7. *Information and material sharing.* The goals of this program are to promote effective communication and to enhance opportunities for collaboration. Proposers are expected to develop and present a clearly delineated understanding of individual member's rights to ideas, information, data and materials produced as a result of the award that is consistent with the goals of the program. Infrastructure plans to support the communication and collaboration should be described. When the proposed activity involves generation of community resources such as databases or unique materials, a plan for their timely release and the mechanism of sharing beyond the membership of the RCN:CIP must be described in the Data Management Plan, a required Supplementary Document. In addition, a plan for long-term maintenance of such resources should be described without assuming continued support from NSF.
8. *International participation.* NSF encourages international collaboration, and we anticipate that many RCN:CIP projects will include participants, including steering committee members, from outside the US. International collaborations should clearly strengthen the proposed project activities. As NSF funding predominantly supports participation by US participants, network participants from institutions outside the US are encouraged to seek support from their respective funding organizations. NSF funds may not be used to support the expenses of the international scientists and students at their home organization. For RCN:CIP projects that involve international partners, NSF funds may be used for the following:
 - o Travel expenses for US scientists and students participating in exchange visits integral to the RCN:CIP project;
 - o RCN-related expenses for international partners to participate in networking activities while in the US; and
 - o RCN-related expenses for US participants to conduct networking activities in the international partner's home laboratory.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and the quality of proposals received. A total award for five years must lie in the range of \$500,000 to \$1,000,000. Up to five awards are expected in FY 2022 depending upon the availability of funds and the quality of proposals received.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.

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.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

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

There are no restrictions or limits.

Additional Eligibility Info:

Organization Limit: Although an RCN:CIP is expected to be multi-organizational, a single organization must serve as the lead and all other organizations as subawardees. Organizations ineligible to submit to this program solicitation may not receive subawards. Ineligible organizations can be proposed to contribute to the network; however, their participation is expected to be supported by non-NSF funding sources.

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 Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- 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: (https://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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.C.2 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 PAPPG instructions.

The following exceptions apply to proposals submitted to this Program:

- For submissions involving multiple institutions, the proposal must be submitted from only one institution, with funding for participating institutions made through subawards. **Proposals must not be submitted using the separately submitted collaborative proposal mode.** Departure from this format will result in the proposal being returned without review.
- Prospective PIs must consult with a cognizant Program Officer to ascertain that the focus and budget of their proposed RCN:CIP is appropriate for this solicitation and obtain permission to submit a proposal. Email documentation from a cognizant Program Officer confirming approval to submit a proposal must be provided in the Special Information and Supplementary Documentation section of the proposal. Noncompliance with this requirement will result in the proposal being returned without review.

The instructions below supplement the guidelines in the NSF PAPPG or NSF Grants.gov Application Guide.

1. Cover Sheet:

- **Proposal Title:** A short informative title for the proposed project that begins with "RCN:CIP: " must be provided.
- **International Partners:** If the proposal involves international partners, check the international activities box, and list the countries involved.
- The system allows one PI and at most four co-PIs to be designated for each proposal. If needed, additional lead personnel should be designated as non-co-PI Senior Personnel on the Budget form.

2. Project Description (maximum 15 pages): In accordance with the guidance in the PAPPG, all proposals must have a separate section labeled "Broader Impacts". The following exceptions and additional items should be noted.

In addition to describing the RCN:CIP objectives, scientific rationale, specific networking activities, and the special features stated in Section II above, the Project Description should also address aspects of RCN Management, Coordination, and Broadening Diversity, Equity and Inclusion as a part of the 15 pages, as described below. All major organizational collaborations should be described and justified in terms of how each serves the needs or enhances the goals of the network.

- **Management Plan:** Describe plans and procedures for the development and assessment of the proposed activity. Include formal mechanisms to ensure fair and equitable allocation of group resources. Clearly define the responsibilities for leadership and the role of the PI and the steering committee. Delineate the procedures used for the selection of initial network participants, the plans for maintaining an appropriate degree of openness and for continually encouraging the involvement of additional interested parties. Means for self-evaluation of progress toward the network goals should be presented as an important part of the management plan.
- **Coordination Plan:** If the proposed network will interface with an established network or group, or if there is a similar activity being planned or ongoing in other countries, describe the plans for coordination and cooperation among the relevant networks.
- **Broadening Diversity, Equity and Inclusion plan:** A Research Coordination Network is an important opportunity for encouraging the involvement of investigators from underrepresented groups (women, underrepresented minorities, and persons with disabilities), early-career investigators, and investigators located in a diverse range of organizations. Describe (1) a plan to increase participation of members of under-represented groups that is specific to their engagement within the proposed network; (2) a plan to involve investigators at a variety of organizational settings; (3) if applicable, a plan to include new researchers, post-docs, and students; and (4) how the plans for increasing diversity are integrated with the proposed project plan.

3. Budget: Provide yearly budgets for the duration of the proposed project. The total budget of the project may not exceed the budget limits described in this solicitation.

- Awardees must participate in annual PI meetings near NSF with travel costs supported by the award. These travel costs must be included in the proposal budget.
- When subawards are involved, yearly budgets are required for each subaward. Research.gov or Grants.gov will generate cumulative budgets for the primary and subaward organizations. A budget justification is required. **Organizations ineligible to submit to this program solicitation may not receive subawards.** Ineligible organizations can be proposed to contribute to the network; however, their participation is expected to be supported by non-NSF funding sources. Allowable costs for international collaboration are described in Section II. Program Description.
- Funds may be requested to promote collaborative activities, such as short visits among member laboratories, exchange visits of students, sharing of unique facilities, establishment of a public web site, network retreats, support of workshops uniquely tied to the network activities, etc. Any well-justified activity that fulfills the goals of the RCN:CIP program will be considered. Funds from this program may not support independent, individual research projects of the participants, nor are they to be used as a mechanism for a mini-grant awarding program.
- Note that funds requested to support activities of the network participants, such as participant travel, materials and supplies for the network projects, and network retreats should be listed as "Participant Support" in the proposed budget and managed by the submitting organization. Please refer to the PAPPG for guidance regarding proposed international travel.

4. Facilities, Equipment and Other Resources: In addition to requirements in the PAPPG, this section should outline institutional and other commitments to the RCN, for example, space, faculty and staff positions, capital equipment, access to existing facilities, commitments for collaboration and outreach programs, and other commitments. The description should be narrative in nature and not include any quantifiable financial information.

5. Supplementary Documentation: In addition to the requirements in the PAPPG, the following information must be provided. Please note that Research.gov currently can only accept one file for Other Supplementary Documents. If submitting via Research.gov, please combine all documents designated as Other Supplementary Documents into one PDF.

- Email documentation from a RCN:CIP cognizant Program Director confirming concurrence to submit an RCN:CIP proposal must be uploaded as a Supplementary Document entitled "RCN:CIP - Program Director Concurrence Email".
- One-paragraph statement (not to exceed one-half page) from each of the major participants that have been listed as participating senior investigators outlining how they view their role in the RCN. This must be specific and not a general letter of support.
- **Letters of Collaboration:** Letters of support should not be submitted, as they are not a standard component of an NSF proposal. On the other hand, letters of collaboration, limited to stating the intent to collaborate and not containing endorsements or evaluation of the proposed project, are allowed. Letters of collaboration should follow the single-sentence format:

"If the proposal submitted by Dr. [insert the full name of the Principal Investigator] entitled [insert the proposal title] is selected for funding by the NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description."

Departure from this format may result in the proposal being returned without review. The Project Description should document the need for and nature of collaborations.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Funds from this program may not support independent, individual research projects of the participants.

A RCN:CIP award is limited to five years in duration. The total five-year proposal budget must lie in the range of \$500,000 to \$1,000,000. The yearly budget must lie in the range of \$100,000 to \$200,000.

C. Due Dates

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

April 25, 2022

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov 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: <https://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 Research.gov may use Research.gov 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 PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.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 *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. 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. (PAPPG 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 PAPPG 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 other underrepresented groups 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

- RCN:CIP proposals will be evaluated for their creativity, innovation, and potential to advance CI Professional communities by transforming and/or establishing new approaches for fostering, nurturing, expanding, and sustaining such communities.
- RCN:CIP proposals must establish the infrastructure to foster networks of CI professionals that span groups that do not typically interact, e.g., across different disciplines or campuses. RCN:CIP proposals cannot use resources to fund primary research or to sustain existing networks.
- For all RCN:CIP proposals involving international collaborations, reviewers will consider: mutual benefits; true intellectual collaboration with the foreign partner(s); benefits to be realized from the expertise and specialized skills, facilities, sites and/or resources of the international counterpart; and active engagement of U.S. students and early-career researchers in the RCN:CIP activities.

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 generally be completed and submitted by each reviewer and/or panel. 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 https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 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 *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 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 *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

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:

- Bogdan Mihaila, telephone: (703) 292-8235, email: bmihaila@nsf.gov
- Alan Sussman, telephone: (703) 292-7563, email: alasusm@nsf.gov
- Thomas Gulbransen, telephone: (703) 292-4211, email: tgulbran@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
- FastLane Help Desk e-mail: fastlane@nsf.gov.
- Research.gov Help Desk e-mail: rgov@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](#).

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 <https://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 (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 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 <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-8134
- **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 [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." 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
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
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National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA
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