

# Resilient & Intelligent NextG Systems (RINGS) - Virtual Organization (RINGS-VO)

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## PROGRAM SOLICITATION NSF 22-590



National Science Foundation

Directorate for Computer and Information Science and Engineering  
Division of Computer and Network Systems  
Division of Computing and Communication Foundations

Directorate for Engineering  
Division of Electrical, Communications and Cyber Systems

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

August 01, 2022

### IMPORTANT INFORMATION AND REVISION NOTES

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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

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#### General Information

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**Program Title:**

Resilient & Intelligent NextG Systems (RINGS) - Virtual Organization (RINGS-VO)

**Synopsis of Program:**

The National Science Foundation (NSF) Directorate for Computer and Information Science and Engineering (CISE) and the Directorate for Engineering (ENG) solicit the submission of proposals to set up a Virtual Organization (VO) for the Resilient & Intelligent NextG Systems (RINGS) program. The RINGS program ([NSF 21-581](#)) is a partnership with the Office of the Under Secretary of Defense for Research and Engineering (OUSD R&E), the National Institute of Standards and Technology (NIST) and a number of industry partners to enhance both resiliency as well as performance across the various aspects of Next Generation (NextG) communications, networking and computing systems. The goal of this solicitation is to invite the submission of proposals to set up a Virtual Organization (VO) for the RINGS program. The VO will facilitate coordination, collaboration, and community-building across academia, government, and industrial partners. The VO will serve the broader RINGS community, including Principal Investigators (PIs), researchers, and students, to coordinate their efforts and streamline their interactions with the RINGS partners in order to reduce burden on and improve synergies within the PI community. The VO will work closely with the RINGS partners to build a strong and effective research community to bolster U.S. leadership across wireless, cloud, and networking sectors.

**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.*

- Alexander Sprintson, CISE/CNS, telephone: (703) 292-8950, email: [asprints@nsf.gov](mailto:asprints@nsf.gov)
- Murat Torlak, CISE/CNS, telephone: (703) 292-7748, email: [mtorlak@nsf.gov](mailto:mtorlak@nsf.gov)
- Erik N. Brunvand, CISE/CNS, telephone: (703) 292-8950, email: [ebrunvan@nsf.gov](mailto:ebrunvan@nsf.gov)
- Phillip A. Regalia, CISE/CCF, telephone: (703) 292-2981, email: [pregalia@nsf.gov](mailto:pregalia@nsf.gov)
- Zhengdao Wang, ENG/ECCS, telephone: (703) 292-7823, email: [zwang@nsf.gov](mailto:zwang@nsf.gov)
- Jenshan Lin, ENG/ECCS, telephone: (703) 292-7360, email: [jenlin@nsf.gov](mailto:jenlin@nsf.gov)

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

- 47.041 --- Engineering
- 47.070 --- Computer and Information Science and Engineering

**Award Information**

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**Anticipated Type of Award:** Cooperative Agreement

**Estimated Number of Awards:** 1

One award is anticipated, up to \$1,000,000 total and up to 3 and a half years in duration, subject to the availability of funds and quality of proposals received.

**Anticipated Funding Amount:** \$1,000,000

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

The budget should be commensurate with the scope of the proposed effort.

**Eligibility Information**

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**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.
- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.

**Who May Serve as PI:**

PIs, co-PIs, and senior personnel who have a currently active RINGS award(s) or have a pending RINGS proposal(s) are not eligible to submit.

**Guidelines for the Participation of RINGS Partner Companies and Affiliated Individuals in Proposals:**

*Guidelines for RINGS Partner Companies:*

A RINGS partner company is not permitted to participate in proposals to this program.

*Guidelines for Individuals Affiliated with RINGS Partner Companies:*

Individuals affiliated with a RINGS partner company may participate in proposals to this program subject to certain limitations and allowances. These limitations and allowances apply to individuals who are currently employed by, consulting for, or on an active agreement to provide services for the company. Specifically:

- Such individuals may not participate in their capacity with the company.
- Such individuals may participate if they (i) hold primary employment at another organization not partnered on the program, and (ii) do so strictly in their capacity at that other organization.

Proposals that violate the above restrictions may be returned without review.

**Limit on Number of Proposals per Organization:** 1

**Limit on Number of Proposals per PI or co-PI:** 1

An individual may be listed as PI, co-PI, and/or senior personnel on no more than one proposal submitted in response to this solicitation. In the event that an individual exceeds this limit, only the first proposal received before the deadline will be accepted, and the rest of the proposals will be returned without review.

**Proposal Preparation and Submission Instructions**

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**A. Proposal Preparation Instructions**

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**

- o 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](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg).
- o 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](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:**

Not Applicable

## C. Due Dates

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

August 01, 2022

## Proposal Review Information Criteria

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### 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

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### Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

### Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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## I. INTRODUCTION

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The Resilient & Intelligent NextG Systems (RINGS) program ([NSF 21-581](#)) supports fundamental research to pursue scientific and technological breakthroughs that will create the bedrock for the next generation wireless networks of tomorrow. Partnering with the private and public sectors (see [NSF 21-581](#) for list of partners), the RINGS program will bring unique experience and insight to research efforts and create the potential to accelerate the translation of fundamental research findings into new technologies that will transform the U.S. economy. The RINGS program is NSF's single largest effort to date to engage public and private partners to jointly support a research program.

The goal of this solicitation is to invite the submission of proposals to set up a "Virtual Organization" (VO) for the RINGS program. The VO will serve the community of researchers funded by the RINGS program by facilitating coordination, collaboration, and community-building across academia, government, and industry. The VO's activities will be instrumental in building a strong and effective research community to bolster U.S. leadership across wireless, cloud, and networking sectors.

## II. PROGRAM DESCRIPTION

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### Program duration and scope

The RINGS-VO program has a duration of three and a half years, and there may be follow-on or related activities. The scope of the VO activities includes post-award coordination across those three years as well as up to six months of post-program "wrap-up" for purposes of memorializing lessons learned and accomplishments. Wrap-up activities may include support for planning and team building for RINGS follow-on programs and initiatives.

### Responsibilities

Proposals must address core aspects of RINGS coordination, community building, and information dissemination. It is expected that the VO will:

- Organize and host community-wide plenary summits. These summits will include presentations on research results, brainstorming and collaboration sessions, topical sessions, and other activities to support effective, interactive community building and information awareness. Two plenary summits will be held annually. At least one plenary is expected to be a physical meeting, and the other plenary may be a virtual meeting, depending on public health guidelines, cost, and community preference.
- Organize and host community webinars/seminars. These informational webinars/seminars are expected to help researchers publicize their accomplishments and findings, and for sponsors to articulate their own visions and perspectives, research opportunities, and independent technical advances that will support the research community.
- Organize and support a common program informational site and collaboration systems to facilitate information exchange and awareness. It is envisioned that there will be a RINGS program site containing (or linking to) research papers and reports, presentations, recordings of demos, summit/tech talk series/seminar videos, tools, data, announcements/newsletters, jobs/internships, open-source repositories, data sets, and other relevant work products. Similarly, the VO will establish channels for community discussion and sharing (email, discussion forums, etc.). The proposal should not include re-creating common tooling or processes that create duplicative effort for academic researchers or RINGS partners.
- Create and facilitate opportunities for collaboration and teaming. The VO will facilitate research collaboration between RINGS researchers and with RINGS partners to enhance the research outcomes and deeper understanding of the results. This facilitation will include organizing and publicizing opportunities for informational meetings between academic researchers and RINGS partners, identifying resources that could be helpful to the academic researchers, and ensuring that all parties have visibility into progress and potential in-kind contributions to the extent possible. In-kind contributions from the partners may include industry researchers, data, equipment, industry prototypes, simulation tools, contextual information, and opportunities for internships. The VO shall also be a catalyst for future research projects and teaming that leverage outcomes from awarded RINGS projects. It will facilitate the creation of research roadmaps, awareness of new technology translation/transfer opportunities, and dissemination of information about related funding and engagement opportunities. Proposed facilitation activities should be sensitive to the time constraints of academic researchers in working with the RINGS partners and should ultimately serve to reduce the burden on the RINGS PIs.
- Liaise with, and facilitate interactions with, other organizations and initiatives as appropriate. As needed by the community, the VO will be expected to facilitate and scale interaction with other research and industry organizations and initiatives, for example PAWR Platforms (<https://advancedwireless.org>), FABRIC (<https://fabric-testbed.net>), CloudLab (<https://www.cloudlab.us>) and other testbed facilities as appropriate, and/or the NextG alliance (<https://www.atis.org>).
- Provide regular reporting to NSF Program Directors. The VO shall consult with and report to NSF Program Directors on an agreed meeting frequency (weekly/monthly) including the activity/interaction tracker monthly reports.
- Perform other activities, as appropriate. Proposers may offer their own insights on activities that best support the VO goals of creating an eminent US research community Next Generation Network, enabling meaningful sharing and collaboration, and facilitating coordination to benefit all parties.

### Webinar Information

NSF will hold an informational webinar in June 2022. Shortly after publication of this solicitation, the date and registration information will be posted on the Program Web page.

## III. AWARD INFORMATION

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One award is anticipated, up to \$1,000,000 total and up to 3 and a half years in duration, subject to the availability of funds and quality of proposals received.

The proposed budget should be commensurate with the scope of the proposed activities.

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

## IV. ELIGIBILITY INFORMATION

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### 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.
- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.

### Who May Serve as PI:

PIs, co-PIs, and senior personnel who have a currently active RINGS award(s) or have a pending RINGS proposal(s) are not eligible to submit.

#### Guidelines for the Participation of RINGS Partner Companies and Affiliated Individuals in Proposals:

##### *Guidelines for RINGS Partner Companies:*

A RINGS partner company is not permitted to participate in proposals to this program.

##### *Guidelines for Individuals Affiliated with RINGS Partner Companies:*

Individuals affiliated with a RINGS partner company may participate in proposals to this program subject to certain limitations and allowances. These limitations and allowances apply to individuals who are currently employed by, consulting for, or on an active agreement to provide services for the company. Specifically:

- Such individuals may not participate in their capacity with the company.
- Such individuals may participate if they (i) hold primary employment at another organization not partnered on the program, and (ii) do so strictly in their capacity at that other organization.

Proposals that violate the above restrictions may be returned without review.

### Limit on Number of Proposals per Organization: 1

### Limit on Number of Proposals per PI or co-PI: 1

An individual may be listed as PI, co-PI, and/or senior personnel on no more than one proposal submitted in response to this solicitation. In the event that an individual exceeds this limit, only the first proposal received before the deadline will be accepted, and the rest of the proposals will be returned without review.

### Additional Eligibility Info:

The submitting organizations must demonstrate the ability to bridge the university researchers, RINGS industrial partners, and government agencies. Submitting organizations should be free of both perceived and real biases that would result in favoritism or disproportionate attention for a subset of stakeholders across industry, academia, and government. The proposers should briefly address this in the project description.

Separately submitted collaborative proposals are not allowed. Support for non-lead collaborating organizations should be requested as subawards. Subawardee organizations are subject to the same eligibility restrictions as those noted above. Separately submitted collaborative proposals will be returned without review.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**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=papppg](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg). 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](mailto: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](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](mailto: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.

Title: Proposal title should begin with "RINGSVO:" then the title.

Project Description:

The project description is limited to 15 pages.

In addition to the content specified in the PAPPG, including the requirement for a separate section labeled "Broader Impacts", the Project Description should demonstrate that the proposers do not have a bias towards any particular sector of the wireless communication industry, nor excessive ties to RINGS partners.

The project description should include the following additional sections:

- Proposed mission, objectives, and approach
- Activities and program elements (optional activities must be clearly identified)
- Organizational structure including key personnel
- Key personnel qualifications and experience
- VO's organizational and management structure
- Approach to avoidance of bias

Budget:

The proposal should include a realistic project budget inclusive of all proposed activities (additional optional activities should be clearly identified). For budgeting purposes, the direct costs of in-person events should not be included (facilities, meals, A/V, etc.)

Supplementary Documentation

Documentation of collaborative arrangements of significance to the proposal through letters of collaboration:

Letters of support are not allowed. Letters of collaboration should follow the format specified in the PAPPG Chapter II.C.2.j. Proposers must not include letters of collaboration from any of the RINGS partners or the PIs, Co-PIs, or senior personnel of RINGS awards. **Any proposal that deviates from these guidelines will be returned without review.**

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## B. Budgetary Information

**Cost Sharing:**

Inclusion of voluntary committed cost sharing is prohibited.

**Budget Preparation Instructions:**

The proposed activities and costs must be necessary and sufficient to support the VO goals as described in this solicitation. Excellent proposals will be realistic in terms of the budget allocated for the proposed activities.

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## C. Due Dates

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

August 01, 2022

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## 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](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](mailto: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](mailto: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

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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/](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 *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. 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

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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

NSF engages in public-private partnerships to increase the potential for research discoveries to develop into innovations with societal impact through market mechanisms. Given this context, all proposals must clearly address the following solicitation-specific review criteria through well-identified proposal elements:

- **Qualifications of the key personnel.** Excellent proposals will be staffed by people that have experience in VO-like activities and have adequate knowledge in the subject matter as well as familiarity with the NextG ecosystem. Proposal activities should be justified as adding value and should not include activities that are not contributing towards VO responsibilities.
- **Avoidance of unnecessary or unrealistic burden for program participants.** Excellent proposals will demonstrate realistic understanding of participant capabilities, academic and corporate culture/environments, and will take these into account by proposing coordination approaches that minimize duplicative or extraordinary effort. Proposals should not have unrealistic process expectations of participants, not require the learning of arcane or custom tools where commonly used tools are available and should accurately reflect an understanding of participant workstyle constraints.
- **Strength of argument for necessity and sufficiency of proposed activities.** Excellent proposals will propose a set of activities and argue effectively that those activities are necessary and sufficient to support the VO goals. Proposals should not include extraneous activities that do not align with the project goals.
- **Cost realism.** Excellent proposals will be realistic in terms of costing the proposed activities. The proposed activities and costs should be necessary and sufficient to support the VO goals as described in other evaluation criteria.
- **Neutrality and avoidance of bias.** There should not be sector bias, nor excessive ties to specific partners. Excellent proposals will demonstrate awareness of, and approaches to, ensuring that the VO is equally responsive to the needs of all participants.

## B. Review and Selection Process

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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.

After completion of the merit review process, NSF may share with representatives of the RINGS partners the subset of proposals which are under consideration for funding by NSF, along with corresponding unattributed reviews and panel summaries. NSF will take into consideration the input of all RINGS partners in addition to feedback from the reviewers prior to making final funding decisions but will retain final authority for making all award decisions.

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 or the Division of Acquisition and Cooperative Support 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

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### A. Notification of the Award

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Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. 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

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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](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](mailto: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](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg).

#### Special Award Conditions:

The RINGS VO award will be made in the form of a cooperative agreement. The RINGS VO cooperative agreement will have an extensive section of Special Conditions relating to the period of performance, statement of work, awardee responsibilities, NSF responsibilities, joint NSF-awardee responsibilities, funding and funding schedule, reporting requirements, key personnel, naming and branding of the RINGS VO, and other conditions. NSF has responsibility for providing general oversight and monitoring of the RINGS VO to help assure effective performance and administration.

PIs, co-PIs and senior personnel cannot have an active RINGS project or proposal and a RINGS VO proposal at the same time.

#### Ensuring Adequate COVID-19 Safety Protocols

- a. This clause implements Section 3(b) of Executive Order 14042, Ensuring Adequate COVID Safety Protocols for Federal Contractors, dated September 9, 2021 (published in the Federal Register on September 14, 2021, 86 FR 50985). Note that the Department of Labor has included "cooperative agreements" within the definition of "contract-like instrument" in its rule referenced at Section 2(e) of this Executive Order, which provides:

For purposes of this order, the term "contract or contract-like instrument" shall have the meaning set forth in the Department of Labor's proposed rule, "Increasing the Minimum Wage for Federal Contractors," 86 Fed. Reg. 38816, 38887 (July 22, 2021). If the Department of Labor issues a final rule relating to that proposed rule, that term shall have the meaning set forth in that final rule.

- b. The awardee must comply with all guidance, including guidance conveyed through Frequently Asked Questions, as amended during the performance of this award, for awardee workplace locations published by the Safer Federal Workforce Task Force (Task Force Guidance) at <https://www.saferfederalworkforce.gov/contractors/>.
- c. *Subawards*. The awardee must include the substance of this clause, including this paragraph (c), in subawards at any tier that exceed the simplified acquisition threshold, as defined in Federal Acquisition Regulation 2.101 on the date of subaward, and are for services, including construction, performed in whole or in part within the United States or its outlying areas. That threshold is presently \$250,000.
- d. *Definition*. As used in this clause, *United States or its outlying areas* means:
  1. The fifty States;
  2. The District of Columbia;
  3. The commonwealths of Puerto Rico and the Northern Mariana Islands;
  4. The territories of American Samoa, Guam, and the United States Virgin Islands; and
  5. The minor outlying islands of Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Islands, Navassa Island, Palmyra Atoll, and Wake Atoll.
- e. The Foundation will take no action to enforce this article, where the place of performance identified in the award is in a U.S. state or outlying area

subject to a court order prohibiting the application of requirements pursuant to the Executive Order (hereinafter, "Excluded State or Outlying Area". A current list of such Excluded States and Outlying Areas is maintained at <https://www.saferfederalworkforce.gov/contractors/>.

## C. Reporting Requirements

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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](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg).

It is expected that research outcomes will be disseminated consistent with the Data Management Plan Guidance for CISE proposals and awards: [https://www.nsf.gov/cise/cise\\_dmp.jsp](https://www.nsf.gov/cise/cise_dmp.jsp).

## VIII. AGENCY CONTACTS

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*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:

- Alexander Sprintson, CISE/CNS, telephone: (703) 292-8950, email: [asprints@nsf.gov](mailto:asprints@nsf.gov)
- Murat Torlak, CISE/CNS, telephone: (703) 292-7748, email: [mtorlak@nsf.gov](mailto:mtorlak@nsf.gov)
- Erik N. Brunvand, CISE/CNS, telephone: (703) 292-8950, email: [ebrunvan@nsf.gov](mailto:ebrunvan@nsf.gov)
- Phillip A. Regalia, CISE/CCF, telephone: (703) 292-2981, email: [pregalia@nsf.gov](mailto:pregalia@nsf.gov)
- Zhengdao Wang, ENG/ECCS, telephone: (703) 292-7823, email: [zwang@nsf.gov](mailto:zwang@nsf.gov)
- Jenshan Lin, ENG/ECCS, telephone: (703) 292-7360, email: [jenlin@nsf.gov](mailto:jenlin@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](mailto:fastlane@nsf.gov).
- Research.gov Help Desk e-mail: [rgov@nsf.gov](mailto: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](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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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

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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](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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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  
Alexandria, VA 22314

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