Cyberinfrastructure for Sustained Scientific Innovation (CSSI)
NSF 21-617

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Directorate for Computer & Information Science & Engineering (CISE)
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Purpose of this Webinar

- Orient potential proposers
- Summarize the CSSI program and review criteria
- Answer questions
- Improve the quality of proposals

Webinar Outline

- CSSI program description
- Overview of solicitation (NSF 21-617)
- Questions from the community – via Zoom Q&A

NSF CSSI Program

- Supports the **development and deployment** of robust, reliable and sustainable **data and software cyberinfrastructure**
- Brings **innovative** capabilities towards sustained scientific innovation and discovery
- Provides a **cross-directorate** opportunity to advance common approaches to sustain and innovate research cyberinfrastructures.
- Follows accepted data management and software development practices

Changes in the Current Solicitation (NSF 21-617)

- A new project class on "Transition to Sustainability" has been introduced
- "Framework Implementations" class has been revised to encourage proposals for sharable and reusable multi-disciplinary CI
- A new requirement for a "CI Professional Mentoring and/or Professional Development Plan" has been introduced
- Proposals may include requests for high-throughput computing resources through PATh
- Priorities for the collaborating NSF directorates and division have been updated
- Proposals must be submitted via Research.gov or via Grants.gov

CSSI Award Classes

Project Class	Description
Elements	Small groups that will create and deploy robust capabilities for which there is a demonstrated need that will advance one or more significant areas of S&E. (Awards <= $600K, up to 3 years)
Framework Implementations	Larger, interdisciplinary teams organized around the development and application of common infrastructure aimed at solving common research problems faced by NSF researchers in one or more areas of S&E, resulting in a sustainable community framework serving a diverse community or communities. (Awards between $600K - $5 Million, between 3-5 years)
Transition to Sustainability	Groups who will execute a well-defined sustainability plan for existing CI with demonstrated impact in one or more areas of S&E supported by NSF. The sustainability plan should enable new avenues of support for the long-term sustained impact of the CI. (Awards <= $1 Million, up to 2 years)

Transition to Sustainability Class of Awards

- **Goal**: is **NOT** to cover the daily operation costs of projects to sustain them, but to **help them implement a well-defined sustainability plan** that will lead to self-sustainability over the long term
  - diversify funding sources
  - create alternative avenues of support (e.g., open-source community support; revenue from memberships, subscriptions, or donations; funding from industry or other federal agencies)
- **Competitive projects should have**
  - a well-developed existing code base
  - an established user community
  - demonstrated impact on scientific discovery, research, and education
  - a well-defined long-term sustainability plan with clear metrics of success

Transition to Sustainability Class of Awards *(cont.)*

- Requests may include funds to support activities such as:
  - further community outreach and engagement
  - user training, documentation, and technical support
  - improvements in code quality, scalability, and accessibility
  - and any other activity needed to achieve the long-term sustainability of the CI
- These awards are <u>not limited</u> to projects previously supported by CSSI

Frameworks Class – New Priorities

- The resulting CI is expected to be sharable, easily findable and accessible, interoperable, and reusable by broad communities.
- Proposers are encouraged to engage multiple disciplines and/or emerging multi-disciplinary communities in the design, development, evaluation, and/or demonstration phases of the proposed CI.

CSSI – Addressing Emerging Concerns

New CSSI solicitation highlights the need to address emerging concerns in Data and Software CI design and development, such as:

- Privacy
- Trust
- Transparency
- Reproducibility
- AI/ML Support
- Energy Efficiency

A Competitive proposal should be..

- Science-driven: Promotes science excellence, enabling fundamentally new scientific advances; benefits science and engineering communities beyond initial participants.
- Innovative: Emphasizes unique NSF contributions; builds the capability, capacity, and cohesiveness of a national CI ecosystem; considers both human and technical aspects of the CI.
- Collaborative: Fosters partnerships and community development; actively engages CI experts, specialists and scientists working in concert with the domain scientists who are users of CI.
- Leveraged: Builds on existing, recognized capabilities.
- Strategic: Encourages measurement of progress and sharing of results.
- Sustained: Provides benefits beyond the participants and the lifetime of the award.

Participating NSF Organizations

- Directorate for Computer and Information Science and Engineering (CISE)
  - Office of Advanced Cyberinfrastructure
  - Division of Computing and Communication Foundations
  - Division of Information and Intelligent Systems
- Directorate for Biological Sciences (BIO)
- Directorate for Education and Human Resources (EHR)
- Directorate for Engineering (ENG)
  - Division of Electrical, Communications and Cyber Systems
  - Division of Chemical, Bioengineering, Environmental and Transport Systems
  - Division of Civil, Mechanical and Manufacturing Innovation
- Directorate for Geosciences (GEO)
  - Division of Atmospheric and Geospace Sciences
  - Division of Earth Sciences
  - Division of Ocean Sciences
  - Office of Polar Programs
- Directorate for Mathematical and Physical Sciences (MPS)
  - Division of Physics
  - Division of Astronomical Sciences
  - Division of Mathematical Sciences
  - Division of Materials Research
  - Division of Chemistry
- Directorate for Social, Behavioral and Economic Sciences (SBE)

Directorate Specific Priorities

Please see the division-level descriptions in the solicitation for complete details of specific priorities across various directorates.

PIs are strongly encouraged to contact program officer(s) from the list of Cognizant Program Officers in the division(s) that typically support the scientists and engineers who would make use of the proposed work.

Proposal Preparation

- Please note that the 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.
- The NSF proposal and award process is detailed in the Proposal & Award Policies & Procedures Guide (PAPPG, NSF 22-1).

  https://www.nsf.gov/pubs/policydocs/pappg22_1/
- The next slides include aspects that are specific to CSSI.

Eligibility

- **Proposals may only be submitted by:**
  - Universities and Colleges
  - Non-profit, non-academic organizations
  - NSF-sponsored federally funded research and development centers (FFRDCs) may apply, provided that they are not including costs for which federal funds have already been awarded or are expected to be awarded.

- **Limit on Number of Proposals per PI/Co-PI/Senior Personnel: "one"**
  - An individual may participate as Principal Investigator, co-Principal Investigator or other Senior Personnel in at most one proposal across all categories of proposal for each deadline.
  - In the event that any individual exceeds this limit, any proposal submitted to this solicitation with this individual listed as PI, co-PI, or Senior Personnel after the first proposal is received at NSF will be returned without review. No exceptions will be made.

Cover Sheet

- **NSF Unit of Consideration (program):**
  - The proposals should choose "Software Institutes" as program.

- **Proposal Title**
  - Proposal titles should begin with "Elements:", "Frameworks:", or "Sustainability:"
  - Examples
    - Elements : *MyProjectTitle*
    - Frameworks : *MyProjectTitle*
    - Sustainability : *MyProjectTitle*

Project Description

In addition to the guidance specified in the PAPPG, address:

- *Project Motivation and Impact* **(Science Driven / Innovation)**
- *Cyberinfrastructure Plans* **(Project plans, and system and process architecture, Building on existing, recognized capabilities, Close collaborations among stakeholders)**
- *Measurable Outcomes* **(Deliverables, Sustained and sustainable impacts, Metrics)**

The project description must explicitly discuss the directorates, divisions or offices to which the proposal is aligned.

If the PI and co-PIs have received prior CSSI funding (or funding through SI2 or DIBBs), the proposal should briefly discuss what software/data services resulted from their prior CSSI award(s) as well as significant outcomes and impacts. This can be done as part of the Results from Prior NSF Support section if appropriate.

Supplementary Documents specific to CSSI

1) **Delivery Mechanism and Community Usage Metrics** (all proposals, 2-page limit)
2) **Management and Coordination Plan** (Framework proposals only, 3-page limit)
3) **CI Professional Mentoring and/or Development Plan** (if requesting funding to support a CI professional, 1-page limit)
4) **High Throughput Computing Resources** (if requesting HTC resources through PaTH, 2-page limit)
5) **Cloud Computing Resources** (if requesting cloud resources through CloudBank, 2-page limit)
6) **Letters of Collaboration** (if any)
7) **Project Personnel and Partner Institutions** (all proposals)

Supplementary Documents specific to CSSI

- **CI Professional Mentoring and/or Development Plan** (required if requesting funding to support a CI professional – 1 page limit)
  - CI Professionals are the professional staff who develop, deploy, manage, and support effective use of the CI (e.g., research software engineers, programmers, IT professionals, data scientists, system administrators, CI facilitators, etc.)
  - Examples of mentoring/development activities include:
    - training in preparation of grant proposals, publications and presentations;
    - guidance on finding opportunities for professional training and career advancement:
    - guidance on effectively collaborating with researchers across multiple S&E disciplines
    - providing information on and training in responsible professional practices.

Supplementary Documents specific to CSSI

- **High Throughput Computing Resources** (if requesting HTC resources through PaTH only - not to exceed 2 pages)
  - *The request should include:*
    - *the anticipated total HTC resources required, with yearly breakdown;*
    - *a technical description and justification of the request, including*
      - the expected number of self-contained tasks per ensemble
      - the resource requirements for each task type in the ensemble
      - the expected number of ensembles
      - the expected input and output data requirements for each task type
      - the expected number and size of shared input files within an ensemble
  - Proposers should include "HTCAccess" (one word without space) as a keyword on the Project Summary page, at the end of the Overview section (before the section on Intellectual Merit).

For more information, please visit: https://path-cc.io/services/credit-accounts/

Supplementary Documents specific to CSSI

- **Cloud Computing Resources** (if requesting cloud resources through CloudBank only - not to exceed 2 pages)
  - *The request should include:*
    - *the anticipated total cost of computing resources, with yearly breakdown;*
    - *which public cloud providers will be used;*
    - *a technical description and justification of the request*
  - Proposers should include "CloudAccess" (one word without a space) as a keyword on the Project Summary page, at the end of the Overview section (before the section on Intellectual Merit).

Cloud Computing Resources *(cont.)*

The NSF Budget should not include any such costs for accessing public cloud computing resources via CloudBank.org. The total cost of the project, including this cloud computing resource request from CloudBank.org, may not exceed the budget limit described in this solicitation.

For example, consider a proposal submitted to the Elements class, which has a total proposal budget limit of $600,000. If a PI wishes to request $20,000 in cloud computing resources through CloudBank, then his/her proposal should request, as part of the proposal budget, no more than $580,000. The remaining $20,000 for cloud computing resources should be specified in the Supplementary Document. If a proposal is a collaborative project with two PIs from two different organizations, then each PI may request cloud computing resources separately through independent Supplementary Documents as long as the total budget (on the budget pages plus in the Supplementary Documents) does not exceed $600,000.

For more information, please visit: https://www.cloudbank.org/faq

NSF Review Criteria

Reviewers and review panel will address:

- Intellectual Merit,
- Broader Impacts, and

Standard NSF Review Criteria

- CSSI Specific Review Criteria

CSSI-Specific Review Criteria

in their reviews, panel discussions, and panel summaries

CSSI Specific Criteria

Project Motivation and Impact

- Science-driven
- Innovation

Cyberinfrastructure Plans

- Project plans, and system and process architecture
- Building on existing, recognized capabilities
- Close collaborations among stakeholders

Measurable Outcomes

- Deliverables
- Sustained and sustainable impacts
- Metrics

Schedule

- Upcoming Deadline for NSF 21-617

December 8, 2021

- **Schedule:**

Proposals Due:	December 8, 2021
Review:	Early 2022
Announcement of Awards:	Spring 2022

Thank you!

Questions?

During Webinar: Via Zoom Q&A

After Webinar: CSSIQueries@nsf.gov

Reminder: All CSSI proposals are due: December 8, 2021

For more information:
https://www.nsf.gov/pubs/2021/nsf21617/nsf21617.htm

Frequently Asked Questions (1)

Q: If I am the PI, co-PI or Senior Personnel on a proposal to CSSI (NSF 21-617):

- *Can I be the PI on any other proposal to CSSI* NO
- *Can I be a co-PI on any other proposal to CSSI* NO
- *Can I be Senior Personnel on any other proposal to CSSI* NO

An individual may participate as PI, co-PI, or other Senior Personnel on at most one proposal across the Elements, Framework Implementations, and Transition to Sustainability class of awards for this solicitation.

In the event that any individual exceeds this limit, any proposal submitted to this solicitation with this individual listed as PI, co-PI, or Senior Personnel after the first proposal is received at NSF will be returned without review.

Frequently Asked Questions (2)

Q: *What types of organizations organizations are allowed to submit proposals?*

- ***Universities and Colleges*** - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- ***Non-profit, non-academic organizations***: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- ***NSF-sponsored federally funded research and development centers (FFRDCs)***, provided that they are not including costs for which federal funds have already been awarded or are expected to be awarded.

Q: *How can other organizations (e.g., industry, international partners) participate?*

Organizations eligible to serve as subawardees are all organizations eligible under the guidelines of the NSF *Proposal & Award Policies & Procedures Guide (PAPPG)*.

Frequently Asked Questions (3)

Q: How can a proposal integrate industry collaboration into the project?

- Industry participants may be included as a subaward within the proposal.
- Industry investigators may serve as co-PIs or senior personnel on a proposal. (See PAPPG, Part I, E.3).
- Industry participants may be (unfunded) collaborators.
- Industry participation should be integrated through the management plan.

Q: Can a foreign organization submit a proposal?

NSF rarely provides support to foreign organizations. NSF will consider proposals for cooperative projects involving US and foreign organizations, provided support is requested only for the US portion of the collaborative effort.

Frequently Asked Questions (4)

Q: We are asked for several additional documents: Two of them are "Project Personnel and Partner Institutions", and "Collaborators and Other Affiliations". How are these documents different, and why does NSF need both of these documents?

- In the "**Project Personnel and Partner Institutions**" you must provide information for **all** personnel and organizations involved in the proposed project. The list must include all PIs, co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, project-level advisory committee members, and writers of letters of support. The listing is collected by the project lead and entered as a Supplementary Document, which is then automatically included with all proposals in a project. NSF staff and the reviewers use this information in the merit review process to manage conflicts of interest.

- For the "**Collaborators and Other Affiliations**" a completed spreadsheet is entered for each PI, co-PI, or senior personnel within each proposal and, as Single Copy Documents, are available only to NSF staff. Proposers should follow the guidance specified in Chapter II.C.1.e of the NSF PAPPG

Frequently Asked Questions (5)

Q: The program solicitation lists "Deliverables" and "Milestones" in section V. A. under both the 15-page Project Description and under the supplementary document labeled "Delivery Mechanism and Community Usage Metrics". How do we address this?

- The Project description should explicitly address "Deliverables" and "Metrics"
- In addition, the "Delivery Mechanism and Community Usage Metrics" supplemental document is required.
- The two components need not be the same but are required. You can choose to address them with different amount of detail in each of those documents (with a duplication being one option).

Frequently Asked Questions (6)

Q: How does the CSSI program differ from Computational and Data-Enabled Science and Engineering (CDS&E) and OAC core research programs?

- CDS&E and OAC core research programs emphasize research in, rather than the development of, cyberinfrastructure systems.
- CSSI focuses upon development of data and software systems that support research.

Thank you!

Questions?

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