

Good afternoon. We're Vipin Chaudhary, Amy Walton, Stefan Robila and Micah Beck from the NSF Office of Advanced Cyberinfrastructure, or OAC.

We are the Program Directors managing the **Cyberinfrastructure for Sustained Scientific Innovation** program, or CSSI.

In this webcast, we will provide a brief overview of the CSSI program, and describe some of the most important things you need to know about submitting a proposal.

Joining us to welcome you is Manish Parashar, Director of the Office of Advanced Cyberinfrastructure at NSF.

Good Afternoon

I am delighted to welcome you to this webinar.

The overarching mission of OAC is to realize an agile, integrated, robust, trustworthy and sustainable CI ecosystem that drives new thinking and transformative discoveries in all areas of S&E research and education. Software and data services represent key components of this CI ecosystem and are central to OAC's mission.

The CSSI program, which was created through the integration of the Software Infrastructure for Sustained Innovation (SI²) and the Data Infrastructure Building Blocks programs, is our flagship program focused on software and data services.

As CSSI moved forward, it is very important that we focus on the services that are delivered. As a result, the current CSSI solicitation emphasizes this as review criteria, focusing on what services will be delivered, how will they be delivered, how can they be used by the user community, and what metrics are associated with their usage.

This webinar will provide you with details about this solicitation as well as answer any questions you may have. I do hope you find this webinar informative.

I will now turn it over to Vipin Chaudhary, Stefan Robila, Micah Beck and Amy Walton who are the cognizant program officers for the program.

This webinar is intended to orient the research community to the CSSI competition, summarize the program and peer-review criteria, and answer questions. Of course, the ultimate goal is to improve the quality of your proposals.

Here is an outline of today's presentation. We'll start with a description of the CSSI program followed by an overview of the NSF 19-548 solicitation.

We will then take questions from you, the audience. Some of the questions we have already received are included at the end of the presentation.

This document will be available on the program website.

Next we talk about the CSSI program, its priorities and goals and how we implement it.

The CSSI program focuses on supporting robust, reliable and sustainable data and software cyberinfrastructure that will support and advance sustained scientific innovation and discovery. Thus, proposals are strongly encouraged to describe their approach to data management and quality software development through a defined software engineering process that includes software testing, the appropriate use of analysis tools and capabilities.

There are a few minor changes to 2019 solicitation as compared to 2018.

The proposals do not have to include *software and data* as a prefix in their title.

The articulation and delivery of cyberinfrastructure services and capabilities are emphasized and included in the solicitation specific review criteria.

Quantitative metrics with targets for delivery and usage of cyberinfrastructure services and community creation are emphasized and included in the solicitation specific review criteria.

The section summarizing priorities for the collaborating NSF directorates and divisions has been updated for 2019.

Instead of the standard 90 day notice for proposal submission, we have reduced the submission notice to 60 days due to minimal changes in this year's solicitation from 2018 solicitation.

The CSSI program is guided by six principles. The project must explicitly address these principles, which translate into solicitation-specific criteria.

- ***The project must be Science-driven***, promoting science excellence, enabling fundamentally new scientific advances; and benefiting science and engineering communities beyond the participating communities.
- ***The project must be Innovative***, emphasizing unique NSF contributions; building the capability, capacity, and cohesiveness of a national CI ecosystem; and considers both the human and technical aspects of the CI.
- ***The project must be Collaborative***, fostering partnerships and community development; actively engages CI experts, specialists and scientists working in concert with domain scientists who are users of CI.
- ***The project must be Leveraged***, building on existing, recognized capabilities.
- ***The project must be Strategic***, with management plans and metrics that encourage measurement of progress and sharing of results.
- ***The project must be Sustained***, providing benefits beyond the participants and the lifetime of the award, and resulting in widely accessible long-term community cyberinfrastructure.

Cyberinfrastructure for Sustained Scientific Innovation is a crosscutting program that involves program officers from every NSF Directorate. Participating divisions and program officers are listed here, and several of our colleagues are attending today's webinar.

The participant list can also be reviewed on solicitation web page at:
<https://www.nsf.gov/pubs/2019/nsf19548/nsf19548.htm>

Within NSF, various organizations have additional specific information about their participation in this program.

The Office of Advanced Cyberinfrastructure (OAC) manages the CSSI program, and is especially interested in proposals that:

- Enable new science and engineering not previously possible.
- Contain innovation as an integral component of the project. Such research might encompass reproducibility, provenance, effectiveness, usability, and product adoption, adaptability to new technologies and to changing requirements, and the data and software development lifecycle processes used in the project;
- Build on existing community CI services and software, and leverage or complement other community cyberinfrastructure (CI) projects
- And seek to develop, deploy and sustain foundational infrastructure components, and interdisciplinary and omni-disciplinary computational tools and components.

The solicitation has details on specific priorities at division level across various directorates. Instead of reading through those details, please refer to the solicitation website for details. Many of them are similar to the 2018 solicitation but others do have changes. We also recommend that you discuss your ideas with the appropriate Program Directors after emailing them a one page summary.

Next we talk about this specific solicitation opportunity (NSF 19-548), including classes of investments, PI eligibility, and review criteria.

The CSSI umbrella includes four different classes of investment. Only the first two investment classes are included in solicitation NSF 19-548; the other classes will not be covered in this webinar.

First is the **Elements**. This class of investment targets 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 science and engineering.

The next class of investment is the **Framework Implementations** that targets 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 science and engineering, resulting in a sustainable community framework serving a diverse community or communities.

The third class of investment is the **Planning Grants for Community Cyberinfrastructure** where the focus is on the establishment of long-term capabilities in cyberinfrastructure, which would serve a research community of substantial size and disciplinary breadth.

Finally, the fourth class of investment is the **Community Cyberinfrastructure Implementations** that focuses on the establishment of long-term hubs of excellence in cyberinfrastructure and technologies, which will serve a research community of substantial size and disciplinary breadth.

I will now cover the budget ranges by investment classes of proposals.

The elements awards shall not exceed a total of \$600,000 and 3 years duration.

Framework Implementations awards shall range from \$200,000 to \$1M per year, and shall be 3 to 5 years in duration.

Note that these are total budget numbers for projects which may include multiple collaborative proposals.

Projects in the upper portion of this range must be exceptional in terms of scientific impact, and as with all proposals, should be discussed with program officers from the divisions that fund the researchers that would be impacted. Proposed funding amounts should be commensurate with the work being proposed, the size of the community that will be affected, and the level of impact anticipated.

Up to 25 Element awards, and up to 10 Framework Implementations awards are anticipated, subject to the availability of funds.

With anticipated total funding of \$46.5M, up to \$15M is expected to be available for Elements awards, and up to \$31.5M is expected to be available for Framework Implementations awards, subject to the availability of funds.

Other divisions and directorates may supplement with additional funds.

All proposals to this solicitation, namely, the elements and framework implementations have the same deadline - April 8, 2019. The deadline for next fiscal year solicitation is November 1, 2019 but we will only target deadlines for April 8 in today's webinar.

We expect the review process lasting from May to July of this year and anticipate making announcements of awards in Fall 2019.

The eligibility criteria for the CSSI program are as follows:

Proposals may only be submitted by universities and colleges, non-profit, non-academic organizations, and 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.

The number of proposals per principal investigator, co-principal investigator, or senior personnel is limited to one. An individual may participate in a proposal as principal investigator, co-principal investigator, or other senior personnel in at most one proposal for a given 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.

Please review the solicitation for details.

Some important aspects to note about the CSSI Cover Sheet.

For the NSF Unit of Consideration, The “Divisions” section should automatically be selected. From the drop-down list in FastLane as the program(s) to consider the proposal, select “Software Institutes” as the Program. It must be the only option.

Grants.gov users should refer to Section VI.1.2. of the NSF Grants.gov Application Guide for specific instructions on how to designate the NSF Unit of Consideration.

For the proposal title, provide a short informative title for the proposed project. To assist NSF staff in sorting proposals for review, proposal titles should begin with "Elements:" or "Framework:", followed by the proposal title.

An example title would be *Element:MyProjectTitle*

A second example title would be *Frameworks:MyProjectTitle*

My colleague Stefan Robila will now go over the supplemental documents required and the review criteria.

The next four slides talk about supplementary documents to be included in the proposal, and a single copy document NSF will need for the merit review process.

Additional supplementary documents include:

A data management plan and postdoctoral trainee mentoring plan (if the project includes such trainees). This is a standard NSF requirement. CSSI reviewers will pay close attention to the data management plan.

For framework implementation proposals, a management and coordination plan is also required with a 3-page limit. The specific roles of the principal investigators, co-principal investigators, other senior personnel, and paid consultants at all institutions involved must be outlined. Also, there must be a description of how the project will be managed across institutions and disciplines, identification of the specific coordination mechanisms that will enable cross-institution and/or cross-discipline scientific integration, and pointers to the budget line items that support these management and coordination mechanisms.

Letters of Collaboration (if any) should include documentation of funded or unfunded collaborative arrangements of significance to the proposal. Letters of collaboration should be limited to stating the intent to collaborate and should not contain endorsements or evaluation of the proposed project. The REQUIRED format for letters of collaboration is in the NSF Proposal & Award Policies & Procedures Guide (PAPPG).

Not following the guidelines will result in your proposal being returned without review.

The proposal must include a Supplementary Document of no more than 2 pages labeled "Delivery Mechanism and Community Usage Metrics." This Supplementary Document should describe the following:

Deliverables: Does the proposed project clearly articulate the services and capabilities to be delivered by the project, and how they are to be delivered? NSF encourages exploration of various delivery mechanisms, including but not limited to, those leveraging XSEDE, leadership-class computing, OAC Software Institutes, Big Data Regional Innovation Hubs, individual organizational resources, and well-known public and private cloud services.

Metrics: Does the proposed project clearly articulate quantifiable metrics for development and delivery of the services and capabilities to be delivered by the project, and for the anticipated community adoption and usage? Are quantitative metrics with targets identified for each year of the award? These should be simple but should also clearly show what the project will accomplish each year, the impact on science, and the breadth of the user community.

Additional supplementary documents also include:

Project Personnel and Partner Institutions. These are required for all award categories. You must provide current, accurate information for all personnel and institutions involved in the project. NSF staff will use this information in the merit review process to manage conflicts of interest. The list must include all PIs, Co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, Postdocs, project-level advisory committee members, and writers of letters of support. See details in the solicitation.

Additional single copy documents include the Collaborators and Other Affiliations Information:

- Collaborators & Other Affiliations information specified in the PAPPG should be submitted using the spreadsheet template found at <https://www.nsf.gov/cise/collab/>. For each proposal, a completed spreadsheet for each PI, co-PI, or senior personnel must be uploaded directly into Fastlane in .xls or .xlsx format as a "Collaborator and Other Affiliations" Single Copy Document.
- NSF staff use this information in the merit review process to help manage reviewer selection; the spreadsheet will ensure the Collaborator and Other Affiliations information has a common, searchable format.

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Note the distinction between this information and the information in previous slide (Supplementary Documents (2)): the listing of all project participants is collected by the project lead and entered as a Supplementary Document, which is then automatically included with all proposals in a project. The Collaborators and Other Affiliations information (this document) is entered for each participant within each proposal and, as Single Copy Documents, are available only to NSF staff.

See details in the solicitation.

As for all proposals received by NSF, CSSI reviewers and panelists will be asked to consider the intellectual merit and broader impact for each proposal for their reviews, panel discussions, and panel summaries. In addition to these standard criteria, CSSI reviewers and panelists will also be asked to consider additional review criteria that are unique to the CSSI program. More on this in a few moments.

When evaluating NSF proposals, reviewers are 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?
- what benefits would accrue if the project is successful?

These issues apply both to the technical aspects of the proposal (the intellectual merits) and the way in which the project may make broader contributions (the broader impacts).

In addition to the standard NSF review criteria, the proposals will be evaluated on CSSI-specific review criteria, namely,

- 1) To what extent is the proposed project science-driven? How will the project outcomes fill well-recognized science and engineering needs of the research community, and advance research capability within a significant area or areas of science and engineering? What will be the broader impacts of the project, such as, its benefits to science and engineering communities beyond its initial targets, under-represented communities, education and workforce development? The project description should provide a compelling discussion of the potential to benefit its intended as well as broader communities.
- 2) To what extent is the proposed project innovative? What innovative and transformational capabilities will the project bring to its target communities? How will the project integrate innovation and discovery into the project activities, such as through empirical research embedded as an integral component of the project activities. Such research might encompass reproducibility, provenance, effectiveness, usability, and adoption of the components, its adaptability to new technologies and to changing requirements, and the development lifecycle processes used in the project;
- 3) To what extent does the proposed project involve close collaborations among stakeholders? How will the project activities engage cyberinfrastructure (CI) experts, specialists and scientists working in concert with the relevant domain scientists who are users of CI.
- 4) To what extent does the proposed project build on existing, recognized capabilities? How will the project activities build on and leverage existing NSF and national cyberinfrastructure investments, as appropriate?
- 5) How well described are the project plans, and system and process architecture? The project description should include high-quality management plans. The project plan should include user interactions and a community-driven approach, and provide a timeline including a proof-of-concept demonstration of the key components. The proposal must include a list of tangible metrics to be used to measure the success of the project activities, and measure progress along the way. If the outcome of the project is software or data cyberinfrastructure, the architecture of the CI and the engineering process to be used for the design, development, documentation, testing, validation and release of the software, its deployment and associated outreach to the end user community, and an acceptance and evaluation plan that involves end users, all must be sufficiently described. The description of the CI architecture and processes should explain how security, trustworthiness, provenance, reproducibility, and usability will be addressed by the project and integrated into the proposed system and the engineering process, and how adaptability to new technologies and changing requirements will be addressed by the project and built into the proposed system, as appropriate.
- 6) To what extent does the project clearly articulate the services and capabilities to be delivered, and how they are to be delivered?
- 7) To what extent Does the proposed project clearly articulate quantifiable metrics for development and delivery of the services and capabilities to be delivered by the project, and for the anticipated community adoption and usage? Are quantitative metrics with targets identified for each year of the award?
- 8) How well does the project address the achievement of sustained and sustainable impacts? The project description should address how the project outcomes and its activities will have long-term impacts, and how these will be sustained beyond the lifetime of the award, as appropriate. If the outcome of the project is software or data cyberinfrastructure, the proposal should identify what license will be used for the released CI, and why this license has been chosen. PIs who have been previously funded under previous CI awards should show quantifiable evidence of the use, impact and sustainability of the previously funded work (and include a citation to the published CI in their biographical sketches as one of their relevant products, if appropriate).

A competitive CSSI proposal will Identify science and engineering challenges where the proposed cyberinfrastructure enables fundamental new science advances, and describe how the proposed project fosters partnerships and community development that will have a significant impact on science and engineering research.

The proposal will indicate how the proposed cyberinfrastructure builds capability, capacity and cohesiveness of a national CI ecosystem; and

Provide a compelling discussion of the cyberinfrastructure's potential use by a wider audience and its contribution to a national cyberinfrastructure.

We have now completed the formal portion of the presentation. Before opening the telephone lines to questions from the audience, we would like to address a few of the questions we have already received.

A key question – and a major change from prior solicitations -- concerns the limits on the number of proposals an individual may participate in under this solicitation (NSF 19-548).

- An individual may participate as PI, co-PI, or other Senior Personnel on at most one proposal across the Elements and Framework Implementations for this solicitation. Thus, if an individual participates on an Elements proposal, he or she may not participate on a Framework Implementations proposal, and vice versa.
- Note that any individual whose biographical sketch is provided as part of the proposal will be considered as Senior Personnel in the proposed activity, with or without financial support from the project.
- 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.

There has been some confusion as to the two deadlines in this solicitation of April 8, 2019 and November 1, 2019. You can participate in submitting proposals to both deadlines as these fall into different fiscal years for NSF. So, you can be a PI, co-PI or senior personnel in one proposal for both April and November submissions. But note that you can only submit exactly one to each of these deadlines.

Proposals must be received by 5 p.m. submitter's local time on the established deadline date. Failure to submit by 5 p.m. submitter's local time will result in the proposal not being accepted.

Please carefully read and follow the instructions provided in the solicitation itself and the NSF *Proposal & Award Policies & Procedures Guide (PAPPG)*. If you need additional help preparing and submitting your proposal, we recommend that you contact your institution's Sponsored Projects Office.

You may use either Grants.gov or Fastlane to apply.

OAC recognizes that software and data infrastructure constitute fundamental infrastructure that cross-cuts academic, government, civic, and commercial organizations. The program encourages proposals to explore novel partnerships beyond academe wherever beneficial and permissible within the guidelines of the NSF *Proposal & Award Policies & Procedures Guide (PAPPG)*.

- What types of 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.

The next question on

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

Here are a couple more questions about collaborations.

- ***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.

The next question is:

- **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.

The next two questions address the differences between this and other solicitations.

- **How do CSSI proposals differ from Computational and Data-Enabled Science and Engineering (CDS&E) and OAC core proposals?**
 - CDS&E and OAC core emphasize research in, rather than the development of, cyberinfrastructure systems.
 - CSSI focuses upon development of data and software systems that support research.

- **And finally, how are data proposals to CSSI different from HDR proposals?**
 - HDR will conduct new research into data intensive approaches while CSSI will develop innovative mechanisms to deliver these approaches to the community in a robust way.
 - HDR PI may develop prototypes for testing their methods but in CSSI it has to go beyond prototype and has to serve the community with clear metrics and goals for delivery, usage and community development.

On behalf of the National Science Foundation and the CSSI team, we thank you for participating in this webinar.

The slides and the script for this webcast, as well as an audio recording, will be available at <http://www.nsf.gov/events/>. On that page, you'll need to look for this webcast among the list of events. I invite your questions now, via email or via telephone to Micah Beck, Vipin Chaudhary, Stefan Robila or Amy Walton. Please use the CSSIQueries@nsf.gov as the preferred mode of inquiry. You can also find contact details for program officers from other NSF Directorates who are involved in the CSSI program on the solicitation web page.

We will now open the lines for live questions.