Introductory Comments for PPoSS webinar

My name is Rance Cleaveland, and I am the Division Director for Computing and Communications Foundations (CCF) within CISE. CCF supports research in the mathematical, scientific and technological foundations of computing; the PPoSS program naturally touches on many of the topics that are central to the CCF mission, from algorithms, communications and computer architecture to programming languages, verification and software testing. The program also intersects with many of the core intellectual bases for other divisions within CISE, including the Computing and Network Systems (CNS) and Intelligent Information Systems (IIS) Divisions and the Office of Advanced Cyberinfrastructure. It is therefore quite fitting that the PPoSS program is receiving significant support from all parts of CISE as a result.
The scale and breadth of this support is important, because PPoSS is addressing a momentous challenge: how to continue the break-neck pace of advancement in computing performance, defined broadly, even as Moore's Law and Dennard scaling are reaching the ends of their runs as the main drivers of innovation in application possibilities. When Moore and Dennard reigned supreme application developers could in many cases not worry about the hardware platforms their applications ran on; the massive performance improvements enabled by these phenomena lifted all boats. We are now entering a new era, where achieving the same pace of transformative computing innovation will require a refamiliarization of different communities (algorithms, hardware, networking, software, systems, …) with each other's domains and the development of new abstractions and paradigms to handle the domain-specific challenges we are already confronting. The PPoSS program, with its combination of large investments and inter-disciplinary focus, stands to play a major role in ensuring our ability to continue delivering revolutionary applications to society.

Slide 1

Good afternoon. We're Funda Ergun, Vipin Chaudhary, Wei Ding, Tracy Kimbrel, Mimi McClure, and Yuanyuan Yang from NSF CISE.
We are the Program Directors for the Principals and Practice of Scalable Systems (PPoSS) program.
In this webinar, we will provide a brief overview of the PPoSS program and describe some of the most important things you need to know about submitting a proposal.
Joining us to welcome you are Erwin Gianchandani, Acting Assistant Director of CISE at NSF and Rance Cleaveland, Division Director for CCF.

<Short intro by Erwin and Rance.>

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This webinar is intended to orient the research community to the PPoSS competition, summarize the program and peer-review criteria, and answer questions.

Here is an outline of today's presentation. We'll start with a description of the PPoSS program followed by an overview of the NSF 20-534 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.

Slide 3

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

Slide 4

The aim of the Principles and Practice of Scalable Systems (PPoSS) program is to support researchers from multiple disciplines to perform basic research on scalability of modern applications, systems, and toolchains.
The intent is that these efforts will foster the development of principles for rigorous and reproducible artifacts for design and implementation of large-scale systems and applications. These principles and methodologies should simultaneously provide guarantees on correctness and accuracy, robustness, and security and privacy of systems, applications, and toolchains. Importantly, PPoSS specifically seeks to fund projects that span the entire hardware/software stack.

Slide 5

If you're familiar with the previous programs XPS and SPX, which are discontinued, some important aspects of this new program will be recognizable. We're looking for collaborations across subdisciplines of computing, including but not limited to those shown. XPS and SPX required collaboration across two or more subdisciplines. PPoSS requires at least four.
Achieving scalability will require coordination across multiple disciplines such as computer architecture, high-performance computing (HPC), programming languages and compilers, security and privacy, systems, and theory and algorithms. Cross-cutting concerns such as performance, correctness and accuracy, security and privacy, robustness and reliability, domain-specific design, and heterogeneity must be taken into account.

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Modern computing systems are increasingly being implemented by composing heterogeneous computing components and continually changing memory systems.

Applications are becoming more domain-specific and highly distributed. Traditional boundaries between hardware-oriented and software-oriented disciplines are increasingly blurred. In this context, we require new abstractions, algorithms, and system stacks in proposals that include content and leverage expertise in at least four different areas, some which we mentioned on the previous slide. Proposals should describe the targeted distributed applications, systems, and platforms. Proposals should also define notions of scale and describe theoretical and experimental evaluation with respect to the full hardware/software stack while rigorously addressing correctness and accuracy, security, and privacy. And finally, proposals should provide evidence of end-to-end scalability based on proposed theories and abstractions.
PI teams must bring together expertise in at least four distinct subdisciplines including but not limited to those shown previously.

Slide 7

Now we'll describe this specific solicitation opportunity (NSF 20-534), including classes of investments, PI eligibility, and review criteria.

Slide 8

The PPoSS program will accept two classes of proposals. Only planning grants are solicited in 2020; LARGE proposals will be accepted starting in 2021. In 2021 and 2022 both Planning and LARGE proposals will be accepted. In 2023 and 2024 only LARGE proposals will be accepted. Planning grants will support small-scale efforts to build teams and formulate goals, and proof-of-concept research efforts are appropriate. LARGE projects are full-scale efforts for full-stack solutions requiring collaborations spanning multiple areas of expertise.

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Proposals for planning awards must not exceed a total of $250,000 and one year duration. Proposals for LARGE awards must not exceed $1M per year and may be 4 or 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. 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.

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Up to 27 Planning awards, and up to 16 LARGE awards awards are anticipated during the five years, subject to the availability of funds.
With anticipated total funding of $86.75M, up to $6.75M is expected to be available for Planning awards, and up to $80M is expected to be available for LARGE awards, subject to the availability of funds.
In 2020, we anticipate funding up to 15 Planning awards.

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All proposals to this solicitation, namely, the Planning and LARGE classes, will have the same deadlines in each year. In 2020 only Planning proposals will be accepted and the deadline is is March 30, 2020. The deadlines for remaining fiscal years will be in January and are listed in the solicitation.
We expect the review process to take place in May and June of this year and anticipate making announcements of awards in Fall 2020.

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The eligibility criteria for the PPoSS program are as follows:
Proposals may only be submitted by universities and colleges and non-profit, non-academic organizations.
The PI needs to be in a tenured or tenure-track position or primary, full-time paid appointment in research/teaching position.
Please review the solicitation for details.

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Now we'll cover 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 of up to 2 pages and postdoctoral mentoring plan (if the project includes such trainees). These are standard NSF requirements. PPoSS reviewers will pay close attention to the data management plan.

For LARGE 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 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.

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Additional supplementary documents also include:

Project Personnel and Partner Organizations. 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, and project-level advisory committee members. See details in the solicitation.

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As for all proposals received by NSF, PPoSS 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, PPoSS reviewers and panelists will also be asked to consider additional review criteria that are unique to the PPoSS program. We'll provide more detail on this in a few moments.

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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).

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In addition to the standard NSF review criteria, the proposals will be evaluated on PPoSS review criteria. Proposals must describe applications, systems, and platforms that will be studied. Measures of scalability and plans to evaluate them theoretically and experimentally are necessary. Design principles applying to the full hardware and software stack must be elucidated. Relevance to the PPoSS program must be supported. For planning grants only, plans for forming a team of PIs for a LARGE project must be included.

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We now invite your questions. While we wait for questions from the audience, we would like to address a few questions we have already received.

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A key question concerns the limits on the number of proposals an individual may participate in under this solicitation (NSF 20-534).
- An individual may participate as PI, co-PI, or other Senior Personnel on at most two planning grant proposals and at most one LARGE proposal each year.
- 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.
- Additionally, there are limits on the numbers of awards throughout the 5-year life of the program. An individual may serve as PI on at most two planning grants and one LARGE award.
- In the event that any individual exceeds these limits, proposals submitted in excess of the limit will be returned without review.
- No exceptions will be made.

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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.

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You may be wondering which of Principles and Practice should be emphasized more.   A proposal should emphasize both principles and practice equally. Please see the solicitation-specific review criteria for more information.

You may also be wondering about the notion of scalability we are looking for. We leave this up to you, and ask you to be sure to define it for reviewers.

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You may be wondering whether it is required to first obtain (or try to obtain) a planning grant to be eligible for the LARGE competition. It is not.
You may also be wondering what is expected in a planning grant proposal. The purpose is to develop capacity for a LARGE project and demonstrate readiness. Preliminary studies and team-building activities are appropriate. Of course, a vision for the outcomes of the LARGE project is important.

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On behalf of the National Science Foundation and the PPoSS 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.

You can email questions to PPoSS@nsf.gov for later inclusion in an FAQ document, but we won't be answering emailed questions in this live session. You can also find contact details for all program officers who are involved in the PPoSS program on the solicitation web page.

We will now open the line for live questions.