Natural Hazards Engineering Research Infrastructure (2015 - 2019) (NHERI)

Network Coordination Office, Cyberinfrastructure, Computational Modeling and Simulation Center, and Earthquake Engineering, Wind Engineering, and Post-Disaster Rapid Response Research Experimental Facilities

PROGRAM SOLICITATION
NSF 14-605

REPLACES DOCUMENT(S):
NSF 13-537

National Science Foundation

Directorate for Engineering
Division of Civil, Mechanical and Manufacturing Innovation

Letter of Intent Due Date(s) ***(required)*** (due by 5 p.m. proposer's local time)*:*

November 06, 2014

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

December 03, 2014

IMPORTANT INFORMATION AND REVISION NOTES

This solicitation replaces NSF 13-537, George E. Brown, Jr. Network for Earthquake Engineering Simulation Operations FY 2015-FY 2019 (NEES2 Ops) to establish the Natural Hazards Engineering Research Infrastructure (NHERI) for 2015 - 2019 through support for a network coordination office, experimental facilities, cyberinfrastructure, and computational modeling and simulation tools for earthquake engineering and wind engineering research. This solicitation will support up to ten separate awards to establish NHERI.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 15-1). The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200). NSF anticipates release of the PAPPG in the Fall of 2014 and it will be effective for proposals submitted, or due, on or after December 26, 2014. Please be advised that proposers who opt to submit prior to December 26, 2014, must also follow the guidelines contained in NSF 15-1.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Natural Hazards Engineering Research Infrastructure 2015 - 2019 (NHERI)
Network Coordination Office, Cyberinfrastructure, Computational Modeling and Simulation Center, and Earthquake Engineering, Wind Engineering, and Post-Disaster Rapid Response Research Experimental Facilities

Synopsis of Program:

This solicitation will establish operations of the Natural Hazards Engineering Research Infrastructure (NHERI) for 2015 - 2019. NHERI is the next generation of National Science Foundation (NSF) support for a natural hazards engineering research large facility, replacing the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). NEES was established by NSF as a distributed, multi-user, national research infrastructure for earthquake engineering through a facility construction phase during 2000 - 2004, followed by operations of this infrastructure to support research, innovation, and education activities from October 2004 through September 2014.

During 2015 - 2019, NHERI will be a distributed, multi-user, national facility to provide the natural hazards engineering community with access to research infrastructure (earthquake and wind engineering experimental facilities, cyberinfrastructure, computational modeling and simulation tools, and research data), coupled with education and community outreach activities. NHERI will enable research and educational advances that can contribute knowledge and innovation for the nation's civil infrastructure and communities to prevent natural hazard events from becoming societal disasters.

NHERI will consist of the following components, established through up to ten individual awards:

- Network Coordination Office (one award),

Cyberinfrastructure (one award),
- Computational Modeling and Simulation Center (one award), and
- Experimental Facilities for earthquake engineering and wind engineering research (up to seven awards, including one award for a Post-Disaster, Rapid Response Research Facility).

Up to ten cooperative agreements are anticipated to commence in 2015, each with a five-year award duration. Awardees will not conduct research under their awards. The primary research enabled by NHERI will be conducted by investigators supported through separate NSF awards. The Awardees and the natural hazards engineering community will work together, through Governance and Awardee activities, to establish a shared vision for NHERI, set natural hazards engineering research and education agendas and priorities, and make NHERI a value-added and productive research infrastructure.

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.

- Joy M. Pauschke, Program Director, Division of Civil, Mechanical and Manufacturing Innovation (Lead Cognizant Program Officer), telephone: (703) 292-7024, email: jpauschk@nsf.gov
- Anna-Lee Misiano, Grants and Agreements Specialist, Division of Acquisition and Cooperative Support, telephone: (703) 292-4339, email: amisiano@nsf.gov
- Kevin Thompson, Program Director, Division of Advanced Cyberinfrastructure, telephone: (703) 292-4220, email: kthompso@nsf.gov

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

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 10

Up to ten awards as follows:

- One award for the Network Coordination Office (NCO).
- One award for the Cyberinfrastructure (CI).
- One award for the Computational Modeling and Simulation Center (SimCenter).
- Up to seven awards for Experimental Facilities (EFs), which includes one award for the Post-Disaster, Rapid Response Research (RAPID) Facility, and a mix of up to six earthquake engineering EF and wind engineering EF awards. There is no predetermined number of earthquake engineering EF and wind engineering EF awards; the awarded mix will be contingent upon the quality of proposals and annual budgets of NSF.

Anticipated Funding Amount: $62,000,000

The anticipated funding amount of $62,000,000 is the estimated total for up to five years for up to ten awards (ten Awardees). The table below shows the anticipated annual base budget support for each Awardee, contingent upon the annual budgets of NSF, the annual performance of the Awardee, and the extent of utilization of Awardee resources by NSF-supported research and education awards. For the RAPID Facility Awardee, a one-time budget increase of up to $1,200,000 in year two will be available for new equipment acquisition and commissioning, contingent upon the outcome of the year one merit review and NSF approval.

Additional support, either through an increase in the base budget or as a supplement, may be provided as follows, contingent upon annual appropriations for NSF and NSF approval:

- For Experimental Facility Awardees in year one to support upgrades as outlined in Section II.G of the solicitation (excluding the RAPID Facility Awardee).
- For all Awardees, as appropriate, to support annual Council work plan activities.
- For Experimental Facility Awardees during years one through five to repair equipment damaged during testing.

Anticipated Annual Support					
Awardee	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**
Network Coordination Office award base budget	$700,000	$900,000	$900,000	$900,000	$700,000
Cyberinfrastructure award base budget	$2,400,000	$2,700,000	$2,900,000	$2,900,000	$2,800,000
Computational Modeling and Simulation Center award base budget	$2,000,000	$2,200,000	$2,300,000	$2,200,000	$2,200,000
Experimental Facilities, total amount for up to six award base budgets	$4,800,000	$5,100,000	$5,400,000	$5,400,000	$5,400,000
Post-Disaster, Rapid Response Research Facility award base budget	$500,000	$1,800,000	$600,000	$600,000	$600,000
Potential Additional Support, total for all Awards: Year One Experimental Facility Upgrades, Annual Council Work Plan Activities, and Experimental Facility Equipment Repairs	$1,600,000	$300,000	$400,000	$500,000	$300,000
Anticipated Total Funding for all awards	$12,000,000	$13,000,000	$12,500,000	$12,500,000	$12,000,000

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- 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.

Who May Serve as PI:

The PI must be a full-time employee of the lead institution by the start date of the NSF cooperative agreement award.

Limit on Number of Proposals per Organization: 2

An academic institution may submit up to two proposals as the lead institution, but may not submit more than one proposal as the lead institution in any one of the following four proposal categories:

1. Network Coordination Office (NCO),
2. Cyberinfrastructure (CI),
3. Computational Modeling and Simulation Center (SimCenter), and
4. Experimental Facility (EF), which includes the Post-Disaster, Rapid Response Research (RAPID) Facility.

A full proposal involving more than one organization must be submitted as a single administrative package from the lead institution; collaborative full proposals with multiple administrative packages will not be accepted and will be returned without review. If the Principal Investigator of a full proposal leaves or transfers to another institution during the review process or after an award is made, the proposal/award remains with the lead institution. Additionally, the lead institution cannot be changed after submission of the full proposal. National laboratories and private sector companies, as well as non-U.S. institutions, may participate in NHERI award activities using their own resources and cannot receive NSF support from an award made under this solicitation; however, this shall not be interpreted to prohibit purchases, services, or sales contracts/agreements with these entities. A proposal for an EF, including the RAPID Facility, must be a single academic institution proposal with all proposed facility resources owned, operated, and maintained by the academic institution and located within the United States to facilitate access by NSF-supported users.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as Principal Investigator (PI) or co-PI in no more than one proposal submitted in response to the full proposal deadline. Applicants are responsible for ensuring that no individual is listed as PI or co-PI in more than one proposal. If an individual is included as PI or co-PI in two or more proposals submitted by the full proposal deadline, then the first proposal submitted, based on the FastLane system time stamp, will be deemed the one allowable submission. All subsequent proposals that include the individual as PI or co-PI will be returned without review.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - 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: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Letter of Intent Due Date(s)** ***(required)*** (due by 5 p.m. proposer's local time)***:***

  November 06, 2014

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

  December 03, 2014

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

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

A. Introduction

During the past several decades, the United States has experienced major earthquake and windstorm (e.g., tornado and hurricane) events, resulting in loss of life, injuries, extensive damage, and loss of basic services vital for post-disaster response and recovery. Such impacts have led to long recovery periods for communities, states, and the nation. The use of experimental testing, computational modeling and simulation, research data, and their integration with theory have become increasingly important research resources to create the knowledge and innovation needed to mitigate the impact of future earthquakes and windstorms, including the natural hazards caused by these events such as tsunamis and storm surge, respectively, on our nation's physical civil infrastructure: buildings and other structures, underground structures, and critical lifelines such as communications, energy, transportation, and water/wastewater systems (References 1-6, Section IX).

The National Science Foundation (NSF) has supported the construction (fiscal year (FY) 2000 - 2004) and operations (FY 2005 - 2014) of distributed, multi-user, national earthquake engineering research infrastructure (experimental facilities and cyberinfrastructure) through the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). Through use of NEES, NSF-supported researchers have advanced fundamental knowledge about the seismic performance of civil infrastructure and created sustainable technologies for structural design, structural rehabilitation, and site remediation; computational, simulation, and visualization research tools; experimental simulation techniques and instrumentation; and sensor technologies. In addition, researchers have deployed NEES equipment, sensors, and data acquisition systems to capture large aftershock building response and generate site profiling data following the 2010 Chile and 2010/2011 New Zealand earthquakes. NEES operations are currently managed under a cooperative agreement with Purdue University, hereinafter referred to as the "incumbent," expiring on September 30, 2014. The NEES research infrastructure supported by the incumbent is described at http://www.nees.org. NSF's support for NEES operations and research ends on September 30, 2014. However, through NSF support, the incumbent will continue to operate only the NEEShub cyberinfrastructure through May 31, 2015, to provide continued operations for the research community and to assist the new cyberinfrastructure awardee made under this solicitation with the cyberinfrastructure transition.

This solicitation establishes the Natural Hazards Engineering Research Infrastructure (NHERI) for 2015 - 2019. NHERI will be a distributed, multi-user, national facility and will provide the natural hazards engineering community with access to research infrastructure (earthquake and wind engineering experimental facilities, cyberinfrastructure, computational modeling and simulation tools, and research data), coupled with education and community outreach activities. NHERI will enable the community to make

research and educational advances collaboratively that can contribute knowledge and innovation to prevent natural hazards from becoming societal disasters. This knowledge base could potentially transform how future civil infrastructure will be designed and how existing civil infrastructure might be rehabilitated.

In accordance with the National Science Board (NSB) Statement on Competition, Recompetition, and Renewal of NSF awards (NSB-08-16), available at http://www.nsf.gov/nsb/publications/2008/nsb0816_statement.pdf, NHERI will be openly competed and will consist of the following components/awards:

- Network Coordination Office (NCO) - one award;
- Cyberinfrastructure (CI) - one award;
- Computational Modeling and Simulation Center (SimCenter) - one award; and
- Experimental Facilities (EFs) for earthquake engineering and wind engineering research - up to seven awards, which includes one award for a Post-Disaster, Rapid Response Research (RAPID) Facility. The RAPID Facility is considered part of the EF component, and is the only new EF to be constructed.

The lead institution on each cooperative agreement, hereinafter referred to as the "Awardee," together with all its partner organizations and others supported on the award, are responsible for complying with the terms and conditions of the cooperative agreement. The primary research enabled by NHERI will be conducted by investigators supported through separate NSF awards.

B. NHERI Operations and Research during 2015 - 2019

The NSF awards for NHERI will contribute to NSF's roles in the National Earthquake Hazards Reduction Program (http://www.nehrp.gov/) and the National Windstorm Impact Reduction Program. NHERI's earthquake engineering components and activities will form the successor to NEES.

NHERI will be part of the NSF-supported portfolio of large, multi-user facilities. The NSF *Large Facilities Manual* (NSF 13-038*)* provides information about the development, construction, and operations of NSF-supported large facilities. As an NSF-supported large facility, within the first two years of the award, Awardees will undergo an NSF business systems review in accordance with the NSF *Business Systems Review Guide* (NSF 13-100). NSF's *Large Facilities Manual* and *Business Systems Review Guide* are available at http://www.nsf.gov/bfa/lfo/lfo_documents.jsp.

C. Natural Hazards Engineering Research Infrastructure Support beyond 2019

The NCO Awardee will be responsible for working with the natural hazards engineering research and education community to develop by September 30, 2017, a *Decadal Science Plan for Natural Hazards Engineering Research, Education, and Research Infrastructure for 2020 - 2029*. NSF will use this decadal science plan as input for natural hazards engineering research infrastructure support beyond 2019.

II. PROGRAM DESCRIPTION

A. Vision for NHERI

NHERI will support multi-hazards engineering research and education, with a focus on earthquake and wind engineering. Historically, research on physical civil infrastructure materials, design, and performance has focused on resilience for a single natural hazard. However, civil infrastructure designed to be multi-hazard resilient will contribute toward broader societal goals, i.e., protect people and property, maintain continuity in essential operations and services, and recover rapidly from a natural hazard event. Design of civil infrastructure is also changing, as strategies for green civil infrastructure are emerging, addressing societal goals for a sustainable nation. Examples of sustainable strategies include sustainable materials, minimization of non-renewable energy use, use of on-site renewable energy source(s), and maximization of material reuse and recyclable components. However, current civil infrastructure designs for single hazard resilience do not always take advantage of new technologies for sustainable civil infrastructure and may not provide multi-hazard resilience. NHERI will support research on sustainable civil infrastructure for resilience to single hazards such as earthquakes and windstorms, enabling the broader context for multi-hazard resilient and sustainable civil infrastructure.

NHERI will enable research and education that can contribute knowledge and innovation for civil infrastructure, over its lifespan, to be multi-hazard resilient and sustainable. NHERI will also support NSF's core value to broaden opportunities and expand participation of groups, institutions, and geographic regions that are underrepresented in science, technology, engineering, and mathematics (STEM) (Reference 7, Section IX). NSF is committed to this principle of diversity.

The vision for NHERI is to enable frontier research and education to:

- Understand, model, and predict the lifecycle performance of civil infrastructure, from component to holistic system levels, under different natural hazard events;
- Reduce the reliance on physical testing for modeling the performance of civil infrastructure under natural hazard events through advanced computational modeling and simulation capabilities;
- Build the basic science knowledge and computational modeling and simulation capabilities to evaluate multi-hazard resilient and sustainable civil infrastructure and communities;
- Translate research into innovative mitigation strategies and technologies to reduce the impact of natural hazards on existing and new sustainable civil infrastructure and communities; and
- Integrate research, education, and outreach to train a broad and inclusive STEM workforce to conduct and translate research into an innovation ecosystem for multi-hazard resilient and sustainable civil infrastructure and communities.

B. NHERI Construct: Operational Goals and Governance, Awardee, and User Roles

To support this vision, the operational goals for NHERI are the following:

- Effective Council of Awardees (hereinafter referred to as the Council), which provides the collective and coordinated leadership for NHERI to operate as an integrated, cohesive, and transparent national facility in service to the natural hazards engineering community;
- Excellence in Awardee leadership, management, award administration, performance assessment, user support, and safe and secure operations of its resources, services, and data infrastructure;
- Active involvement of the natural hazards engineering community in Governance and Awardee activities;
- Open and equal access to NHERI, with NHERI used by an external and broadly inclusive user base of researchers and educators;

- Evidence-based development of the current and next generation workforce to conduct natural hazards engineering research, educational activities, and professional practice; and
- Value-added strategic partnerships that bring additional unique national and international resources and capabilities to NHERI.

The NHERI construct will consist of the Awardees (NCO, CI, SimCenter and EFs), Governance, and Users, with the role for each outlined below in Tables 1, 2, and 3, respectively. The NHERI construct is designed to achieve its vision and operational goals in an effective manner. The Awardees and user community will work together, through Awardee and Governance activities, to establish a shared community vision for NHERI, set natural hazards engineering research and education agendas and priorities, and make NHERI a value-added and productive national facility.

Awardees: The awards will have the roles shown in Table 1; the requirements and responsibilities for all Awardees and for each component/Awardee are outlined later in this section.

Table 1. Awardees

Component	Role
NCO	The NCO will serve as the scientific national and international leader, community focal point, and network-wide coordinator for Governance, cross-Awardee, and community-building activities. Key activities will include convening the Governance groups, working with the Council to develop consensus-based policies and procedures for NHERI and the annual Council work plan, implementing the Facility Scheduling Protocol to provide users access to the EFs, leading development of community Science Plans, running NHERI-wide education and community outreach programs, and building strategic partnerships.
CI	The CI Awardee will serve as the integrator for enabling NHERI to be a virtual organization for the natural hazards engineering community, by providing an array of information, resources, and services, including the definitive NHERI website, NHERI data repository, software service delivery platform with computational modeling, simulation, and educational tools, collaboration tools, access to computing resources, and user training and support. The CI Awardee will establish and implement a NHERI-wide cybersecurity plan with all Awardees.
SImCenter	The SimCenter will develop and deliver to the CI Awardee for integration onto the CI Awardee's software service delivery platform, a portfolio of computational modeling and simulation software and educational modules that reflects a balance of community-prioritized, new capabilities for earthquake, wind, and multi-hazard engineering research and education. The Awardee will provide training and technical support to users of its software tools.
EF, including RAPID Facility	Each EF will provide resources, services, and staffing to enable earthquake engineering, wind engineering, or post-disaster, rapid response research requiring experimental work. Each EF will provide a well-maintained and fully functioning facility and support users who are provided access through the NCO's Facility Scheduling Protocol. Experimental data generated by EF resources and its users will be archived in the NHERI data repository.

Governance: The Governance structure will be implemented through the four groups shown in Table 2. The "Committees" group may include multiple committees. Each group, including each separate committee under "Committees," will publish an Annual Community Report on the NHERI website. For each of these groups, the names of member organizations and names, including chair positions, must not be included in proposals; rather these groups will be appointed post-award by either the NCO or the user community. The number of in-person meeting and travel costs should be minimized through the use of electronic communication and video teleconferencing.

Table 2. Governance

Group	Role	Membership	Meeting Frequency
Council	To provide collective and coordinated leadership for NHERI as a national facility.	All Awardee Principal Investigators (PIs).	At least quarterly.
Network Independent Advisory Committee (NIAC)	To provide independent guidance and advice to the Council on the following: (a) progress, plans, and performance of the Awardees and annual Council work plan, (b) an assessment of the level of community engagement and user satisfaction across NHERI, with input from the User Forum survey results, (c) an assessment of NHERI's continuing value added for and impact on research and educational advancements, and (d) assessment of the transparency and efficiency of the NCO's Facility Scheduling Protocol.	Diverse representation from the broad scientific and engineering communities served by NHERI. Members may not be from an Awardee institution. The NCO will appoint the NIAC members, with input from the Council.	At least semi-annually.
User Forum	To provide the Council with independent advice on community user satisfaction, priorities, and needs relating to the use and capabilities of NHERI. Through financial and secretariat support provided by the NCO, the User Forum will conduct an annual community user satisfaction survey for NHERI. Representatives from the User Forum will participate as observers in the NCO's Facility Scheduling Protocol.	User representatives from the broad scientific and engineering communities served by NHERI, elected by the user community; members may not be from an Awardee institution.	At least semi-annually.
Committees	To advise the Council on community priorities and needs for NHERI, serving and benefiting multiple Awardees and avoiding duplication of effort and costs among Awardees. The Committee structure will be established by the Council.	Dependent upon purpose; may consist of community/user representatives and/or cross-Awardee staff. The NCO will appoint the committee members, with input from the Council.	Dependent upon purpose of each committee.

Users: Users will contribute to and participate in NHERI, as appropriate, as shown in Table 3.

Table 3. Users

Composition	Role
Users will come from the natural hazards engineering and related communities, including groups, regions, and institutions underrepresented in STEM, and may include both U.S. and international users.	Conduct research and education activities using NHERI's resources and services. An EF may require that users pay user fees/recharge rates to cover costs not supported by the NSF NHERI award; therefore, users should check with the EF before submitting an NSF proposal.

	Contribute computational modeling, simulation, and educational tools to NHERI.
	Participate in Awardees' activities.
	Provide input on Science Plans for future research and education directions.
	Serve on Governance groups to represent the priorities, needs, requirements, and feedback from the user community.
	Provide feedback in user satisfaction surveys.

Figure 1 shows a notional diagram for the NHERI construct.

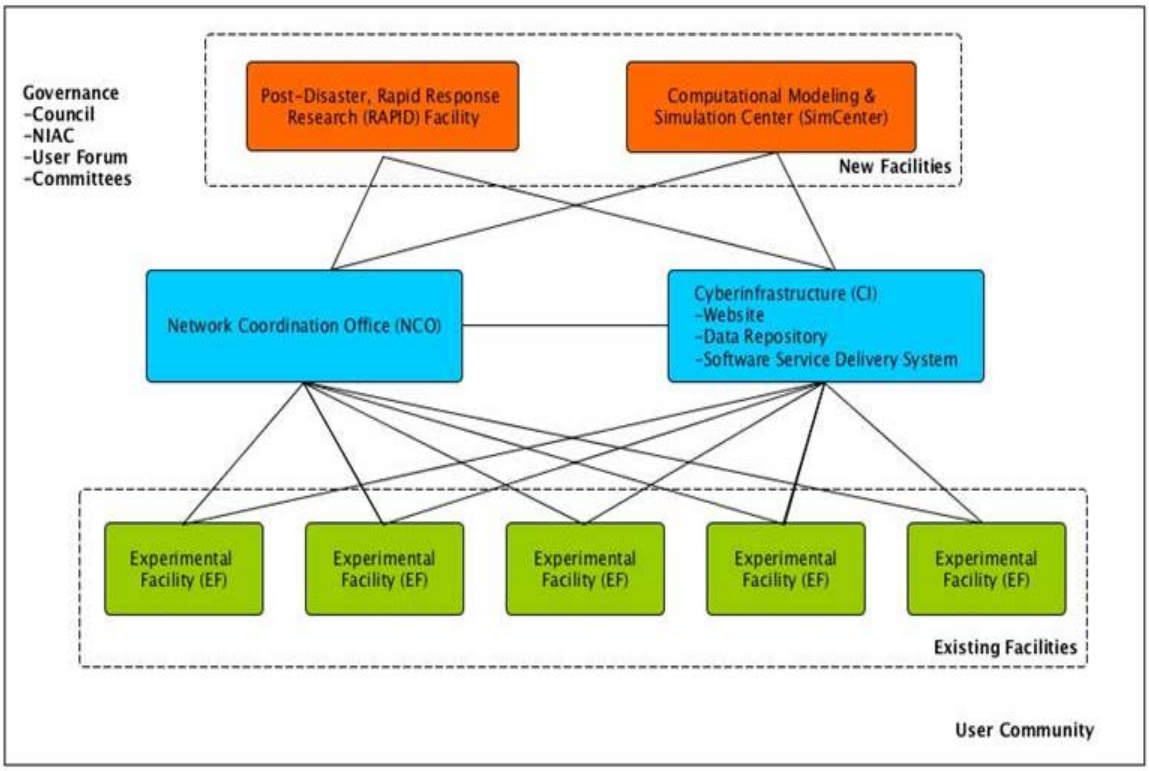

Figure 1. Notional NHERI Construct

C. All Awardees (NCO, CI, SimCenter, and EF) - Common Awardee Requirements and Responsibilities

Requirements

1. *Project Headquarters:* Each Awardee will provide sufficient co-located campus space, resources, and Internet and Internet2 connectivity to support the project leadership, management, operations, activities, collaborations, and users.
2. *Organizational Structure and Staffing:* Each Awardee will establish and maintain an organizational structure and staff capable of effectively leading, planning, managing, implementing, overseeing, assessing, and reporting on its award. There should be active lead institution oversight, clear lines of authority, identified project roles and responsibilities, and lines of communications and interactions with the Governance, other Awardees, users, and the broader natural hazards engineering community. The Awardee PI will be the Director of the NHERI component, should be a distinguished earthquake engineering or wind engineering researcher, will lead the scientific and operational vision for the component, and will serve on the Council. Additional staff are to be commensurate with scope of the project, and should include expertise in cybersecurity and its implementation. The project staffing demographics should strengthen NHERI's role in increasing participation by groups that are underrepresented in STEM. Additional staffing requirements are listed below for each NHERI component.

Responsibilities

1. *Participation in the Council:* The Council will be led, organized, and convened by the NCO. Awardees will participate in the following activities:

    - Establish the Council Charter and Operating Procedures;
    - Develop consensus-based policies and procedures for NHERI resources, activities, data sharing, and user access, adapting policies and procedures implemented for NEES as applicable (see http://nees.org/aboutnees/policies);
    - Contribute the Awardee's Science Plan to the *NHERI Science Plan for 2015 - 2019*, which outlines community-prioritized research and education directions for NHERI, building upon the Awardees' Science Plans, NHERI vision, and broadly obtained community input;
    - Develop the consensus-based annual Council work plan for the next award period, for cross-Awardee activities and operational efficiencies, to make NHERI greater than the sum of the parts. Each Awardee's scope identified in the Council work plan will be incorporated into its individual annual work plan, schedule and NSF budget request for next year support. Examples of cross-Awardee activities might include acquisition of shared facility instrumentation, development of software needed for operations by a subset of Awardees, and coordinated community outreach activities;
    - Participate in two NIAC meetings per year, to provide input on Awardee resource utilization, progress, plans, performance assessment, and community impact, receive recommendations to improve operations, and respond to

recommendations;
    - Establish the committee structure and membership; participate in meetings relevant to Awardee scope;
    - Publish an Annual Council Community Report on the NHERI website, summarizing the Council's current year progress, activities, and community impact and informing the community of the Council's plans for the next year; and
    - Other activities determined by the Council;
2. *Science Plan:* Each Awardee will operate with a Science Plan that supports the NHERI vision in Section II.A. The Science Plan should outline: the compelling scientific vision, grand research challenges, the key research questions at the cusp of emerging discoveries for earthquake, wind, and/or multi-hazards engineering, and potential technical breakthroughs that can be enabled by the proposed component; the major resources, services, and activities to be provided to support investigation of these research questions; and the expected user base for each major resource, service, and activity. The Awardee's plan will contribute to the *NHERI Science Plan for 2015 - 2019* to provide users with the research questions that NHERI can facilitate;
3. *Operations:* Each Awardee will be guided by its project management plan for operations, which will incorporate the NHERI operational goals and role of the component in Section II. B and the requirements and responsibilities for all Awardees and for the specific NHERI component as outlined in this section, to include the following:
    - *Strategic Plan for Operations,* with vision, goals, objectives, key deliverables, milestones, performance metrics and targets for the metrics. The metrics should assess performance, include qualitative and quantitative measures, and track staffing, user, and activity participant demographics and community utilization of major resources and services;
    - *Marketing and Broadening Participation Plan for Developing the User Base;*
    - *Project Management and Performance Assessment*, with leadership; management, business, financial, and human resources systems; policies and procedures; and performance assessment mechanisms for tracking activities, schedule, progress, deliverables, budget, expenditures, program income, and staffing levels against the work plan and performance metrics. There should be mechanisms for incorporating feedback from the Governance groups and users to evaluate progress, effectiveness, impact, and evolving stakeholder priorities and needs;
    - *Work Breakdown Structure (WBS) and Dictionary,* which define the complete Awardee scope and deliverables;
    - *Annual Work Plan*, aligned with the Strategic Plan for Operations, WBS, and annual Council work plan, which identifies activities, tasks, deliverables, schedule and budget for the annual award period;
    - *Cybersecurity Plan and Implementation,* coordinated with the CI Awardee; and
    - *Risk Management Strategy and Plan,* including a risk assessment matrix;
4. *Education and Community Outreach (ECO) Program:* ECO activities should be strategically planned, well-principled, and appropriate for the target audience; broaden participation of groups, regions, and institutions underrepresented in STEM; and use appropriate assessment mechanisms. ECO activities will be a combination of NHERI-wide and Awardee-specific activities, with NHERI-wide activities to include participation by all Awardees in the following activities:
    - NCO-organized Research Experiences for Undergraduates (REU) site program, with each Awardee hosting at least two REU students;
    - NCO-organized NHERI Summer Institute for early career faculty and graduate students; and
    - Awardee activity information provided frequently to the CI Awardee to post on the NHERI website. Awardees will not develop and maintain separate websites; and
5. *Software Development and Lifecycle Management Plan,* to be established by each Awardee to include:
    - Scientific justification for the software in terms of gaps in existing software capabilities, documented user requirements, and targeted user community (size and composition of expected user base);
    - Identification of the software license to be used for the software release, and why this license is chosen;
    - Use of open source software, where appropriate or applicable, and leveraged investments made by NSF and other Federal agencies for software, data management infrastructure, campus and/or national high performance and distributed computing resources, and other cyberinfrastructure and software tools;
    - Software architecture and technology required, including dependence on other software, projects, and systems, and interoperability with widely used community tools;
    - Lifecycle management: development, deployment, testing, validation, and verification, use of testbeds, maintenance, staffing, user training and support, and budget, including the tasks necessary to take the software from prototype to delivery as a reusable software resource and an assessment plan with metrics to measure success and failure of the new software;
    - Potential risks, including risks associated with establishment and execution, necessary infrastructure and associated technologies, community engagement, and long-term support; and
    - Plan to integrate content and tools so as not to preclude sharing and future porting without renegotiation of proprietary agreements.

D. Network Coordination Office (NCO) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones

Requirements

Staffing (additional): The NCO Director (NCO Awardee PI) also should have prior accomplishments in the following: (a) strategically leading and managing distributed resource projects, (b) leading a research community to advance knowledge frontiers, (c) implementing technology transfer and innovation for natural hazards mitigation, and (d) broadening participation of groups, regions, and institutions underrepresented in engineering. Additional staffing should include the following: an experienced Experimental Facility Scheduler, with expertise in scheduling users among distributed resources and resource scheduling software; secretariat support for the Governance groups; and scientific and educational expertise for ECO activities, with skills in the use of a wide variety of media, formal and informal science and engineering outreach activities for targeted audiences, evaluation and assessment, REU site and Summer Institute program administration, broad stakeholder engagement, workforce development, printed and web-based publications, cataloging information, and graphic arts.

Responsibilities

1. *Governance Support:* Organize, convene, and provide secretariat support for all work of the Governance. The NCO will appoint the NIAC and committee members, with input from the Council. The NCO will provide travel support, as required, for Governance group members external to the Awardees, organize the election of the User Forum, and provide assistance and financial support for the User Forum to conduct its annual community user satisfaction surveys. The NCO will post Governance meeting minutes on the NHERI website;

2. *Facility Scheduling Protocol*: Implement a centralized Facility Scheduling Protocol, working with all EF Awardees and the User Forum. To support transparent, open, and equal access, the NCO Awardee, rather than each EF Awardee, will be responsible for scheduling user time (NSF-supported and non-NSF-supported) at each EF, including the RAPID Facility. The Protocol should address scheduling policies and procedures for EF user access and metrics for measuring wait time in queues and throughput. The NCO will use software for scheduling individual facility resources and users, develop and maintain a Facility Scheduling Dashboard on the NHERI website, and implement processes for NSF-supported investigators

to initially request EF utilization through forms that could be included in all NSF proposals requesting access and for non-NSF supported users (or for an EF Awardee on behalf of these latter users) to request access;

3. *Community Research and Education Agendas,* with broad community input:
    - Lead and organize development of the *NHERI Science Plan for 2015 - 2019*; and
    - Lead and organize development of the *Decadal Science Plan for Natural Hazards Engineering Research, Education, and Research Infrastructure for 2020 - 2029,* to be completed by September 30, 2017;
4. *Strategic Partnerships:* Build partnerships with national and international entities and other stakeholders to enhance the scientific experimental, cyberinfrastructure, computational, and ECO resources and support available to NHERI users; and
5. *ECO Program:* In accordance with the responsibilities listed in Section II.C, organize the NHERI-wide ECO program, working with the other Awardees, to include:
    - An annual NHERI-wide REU site program, organized and conducted in accordance with the NSF REU program solicitation, NSF 13-542, http://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=5517&ods_key=nsf13542, or successor solicitation(s) in effect at the time of implementation;
    - An annual NHERI-wide Natural Hazards Engineering Research Summer Institute;
    - Activities to engage an active and expanded natural hazards engineering community to become productive users of and contributors to NHERI through outreach to groups, regions, and institutions underrepresented in STEM and natural hazards engineering research, and facilitating collaborations for research and education among users;
    - Facilitation of the community to organize campaigns and teams to conduct research and education in support of the *NHERI Science Plan for 2015 - 2019*; and
    - Information dissemination about NHERI resources, activities, research outcomes, accomplishments, and impact, posted on the NHERI website, to include:
        - Major highlights and syntheses of NHERI research and education outcomes, through forums such as newsletters, reports, speaker series, workshops, special conference sessions, web-posted case studies, and special journal editions or monographs;
        - Community notification about upcoming activities and committee meetings;
        - An active social media presence that engages a variety of communities; and
        - Web-based catalog of journal and other publications describing research, educational, and workforce development outcomes enabled by NHERI.

Key Year One Milestones

- Within six months of award,
    - Governance groups established and all groups met at least once.
    - Facility Scheduling Protocol implemented, with the Facility Scheduling Dashboard posted on the NHERI website.
    - Consensus-based policies and procedures for NHERI completed and posted on the NHERI website.
    - Initial strategic partnerships implemented.
    - Software Development and Lifecycle Management Plan updated.
- By September 1 annually, completion of the annual Council work plan.
- By end of year one,
    - Completion of the *NHERI Science Plan for 2015 - 2019* and posted on the NHERI website.
    - Completion of the User Forum community user satisfaction survey.
    - Organization of the REU site program and Summer Institute, for implementation beginning in year one or two.

E. Cyberinfrastructure (CI) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones

Cyberinfrastructure underpins and integrates NHERI as a virtual organization and provides Awardees and users with resources and services for research, collaboration and knowledge sharing. It enables discovery, technology transfer, innovation, education, and community outreach. It can also bring additional resources to NHERI through leveraging and interoperability with other NSF and Federally supported cyberinfrastructure projects. The CI Awardee may propose to change the NHERI name/acronym to be consistent with an appropriate and available Internet domain name. If NSF accepts this new name/acronym, then at the pre-award stage, NSF will change the titles of all NHERI awards to begin with this new acronym.

The overall design and operations of the cyberinfrastructure should incorporate research and best practices in providing cyberinfrastructure for virtual organizations. In addition, the CI Awardee should seek additional NSF funding opportunities to expand/enhance the cyberinfrastructure beyond the support provided under the NHERI award. The cyberinfrastructure will not be static and should evolve as the community develops richer tools with increasing data volumes and computational requirements; therefore, operations should include a strategy to periodically refresh/upgrade the cyberinfrastructure through new releases.

The CI Awardee should utilize/adapt the incumbent's NEEShub cyberinfrastructure content (including data and education materials) currently available on the NEEShub platform at http://www.nees.org to the new cyberinfrastructure. These content, software, and tools must be integrated into the Awardee's cyberinfrastructure in a way that does not preclude their sharing and future porting and use across other platforms. If transition to a different platform becomes necessary in the future, then the CI Awardee will be responsible for ensuring that all content, software, and tools are fully transitioned to that platform without requiring renegotiation of proprietary agreements.

The current NEEShub Project Warehouse is based on commercial database software and primarily contains earthquake engineering experimental data. The NHERI data repository should be resourced to curate and archive the following data: (1) earthquake engineering data in the NEEShub Project Warehouse, (2) experimental data from NSF-supported awards that tested under the incumbent's operations and are not yet archived and curated, (3) experimental data generated by awards under the NSF 13-544, George E. Brown, Jr. Network for Earthquake Engineering Simulation Research Planning Grants, and NSF 14-557, Decision Frameworks for Multi-Hazard Resilient and Sustainable Buildings, solicitations, (4) experimental data generated through use of NHERI resources, and (5) by the end of year two, the capacity to archive and curate the following: experimental data generated by earthquake and wind engineering research awards supported by NSF (whether or not NHERI resources are used), data collected from earthquake and windstorm event investigations using RAPID Facility resources, data collected under NSF-supported RAPID awards investigating earthquakes and windstorms, legacy data sets identified as high priority data by the earthquake and wind engineering research communities, and experimental data from global partners that are agreed upon by the CI Awardee in support of such partnerships.

Requirements

1. *Location*: To the maximum extent practical, the CI Awardee's role, requirements, responsibilities, resources, and services should be implemented by staff employed at the Awardee's institution.
2. *Staffing (additional):* The CI Director (CI Awardee PI) also should have prior accomplishments in cyberinfrastructure design, development, operations, and management for research communities. The leadership, management, and operations staff should have expertise and prior accomplishments in developing, deploying, operating, and maintaining cyberinfrastructure, including an open source, archival and curated data repository and a software service delivery platform, and be knowledgeable in earthquake and wind engineering research experimentation, computation, digital preservation, metadata and data. The staff should be skilled in software development, making software user friendly, and providing user training and support.

Responsibilities

1. *Design, Development, Operations, and Management of Cyberinfrastructure,* to include:
    - *Design Strategy,* which is driven by the user community's priorities and user requirements, lifecycle costs, state-of-the-art, best practices, and leveraging of existing resources;
    - *Requirements Traceability Matrix,* which captures community priorities and user requirements that informs the design; there should be strong scientific justification, responsiveness to community priorities and needs, and a "critical mass" user base for the resources and services provided;
    - *NHERI-wide Identity, Trust, and Cybersecurity* plan, protocols and systems, including ongoing cybersecurity checks for NHERI-wide resources, including the NCO, EF and SimCenter Awardee systems, which utilize existing institutional procedures. The CI Awardee will be a leader in supporting resource access in a federated identity setting mode, e.g., by joining the InCommons federation (http://www.incommonfederation.org/);
    - *System Architecture and Software Design Approach*, enabling a high speed, interactive cyberinfrastructure for the community;
    - *Interoperability,* where appropriate, with other cyberinfrastructure and software development projects;
    - *Leveraged Resources*, from NSF and other Federally supported cyberinfrastructure, software infrastructure, and campus and/or national high performance and distributed computing resources;
    - *Operations*, with 100% near up time and with staffing expertise appropriate for the full spectrum of resources and services provided;
    - *Maintenance*, including a timeline for releases of upgrades to maintain state-of-the-art resources and services for the user community based on the Requirements Traceability Matrix and performance assessment; and
    - *Cyberinfrastructure Performance Assessment,* analyzing user data from the cyberinfrastructure instrumentation, software tool forum, annual usability study, Governance feedback, and other collected data;
2. *Provision of Community-driven, Production-quality Cyberinfrastructure,* which serves as the natural hazards engineering research and education gateway, with the baseline to include:
    - *An Interactive NHERI Website,* which is the network's outward facing portal and the user community's definitive interface to all NHERI resources and services. The CI Awardee will provide the infrastructure and content management software for all Awardees to provide information and tools. This website will be the portal to resources such as the NHERI data repository; access to computing resources; software services delivery platform with a suite of research and educational software tools, including those developed by the SimCenter Awardee; collaboration tools; a community calendar of events; the NCO's Facility Scheduling Dashboard; and EF Awardee information requested below in Section II.G;
    - *Fully Operational, End-to-End Data Management Infrastructure,* which includes a state-of-the-art, open source, curated NHERI data repository; robust data management tools for curating, archiving, searching and retrieving data; metadata and data protocols and formats; and policies, procedures, and preservation for curating and archiving earthquake engineering and wind engineering experimental data and post-disaster, rapid response research data. The repository should be interoperable with external repositories identified by the community in the Requirements Traceability Matrix. The CI Awardee will work with the EF Awardees to deliver tools that allow automatic upload of metadata and data to the repository and curation at the source during experimentation, as feasible;
    - *Software Service Delivery Platform,* for the SimCenter and other Awardees and users to deliver research and educational software tools for publishing and use on the cyberinfrastructure, through published interfaces and specifications for minimum quality and functionality requirements for software acceptance to the platform. The CI Awardee will develop and use a metadata standard for the software tools so that they can be managed within the cyberinfrastructure framework;
    - *Computational Modeling, Simulation, Visualization, and Educational Tools*, delivered for community use through the software service delivery platform. The CI Awardee will make these tools executable and user friendly on the software service delivery platform. The CI awardee will provide user support for the use of the tools on the platform, but the developer for the software tool will be responsible for separately providing technical user support through their own funding. The CI Awardee will deliver and support execution on the delivery platform the following software tools:
        - Incumbent's tools and educational materials on the NEEShub; the cost of transfer of these materials to the new platform will be the CI Awardee's responsibility;
        - Tools developed by the SimCenter Awardee;
        - Existing tools identified by users as critical for natural hazards engineering research and education;
        - New research and educational tools developed by external users; and
        - Experimental testing tools of broad user interest;
    - *Access to User Required Computing Resources*, through facilitated access to and use of campus and/or national high performance and distributed computing resources;
    - *Software Tool Forum,* through a platform for vetting the quality of software tools and educational resources and posting user case studies/examples of implementation;
    - *Knowledge Management and Workflow Tools,* to improve users' research productivity;
    - *Posted Case Studies of Data Reuse;*
    - *Collaborative and Video teleconferencing Tools,* for Awardees, Governance, and Users;
    - *Cyberinfrastructure Instrumentation,* for collecting data on web, software tool, and resource usage; and
    - *User Support,* for all aspects of the cyberinfrastructure, including user training, manuals, and tickets;
3. *Annual State-of-the-Art Analysis Report*, which summarizes recent advances and new technologies in the field for cyberinfrastructure and presents cost/benefit analyses for status quo or planned upgrades, mapped to ongoing user requirements;
4. *Annual Usability Study* of the cyberinfrastructure, including the NHERI website, data management infrastructure, and software service delivery platform, and use of the results for continuous improvement; and
5. *ECO Program,* in addition to the responsibilities listed in Section II.C, to include:
    - Training programs for active and prospective users on all aspects of the cyberinfrastructure;
    - Organization of Virtual Communities of Practice that contribute to and use the software tools and data in the NHERI repository for research and education; and
    - Monthly and Annual Community Reports that inform users about new releases, software tools, data sets, and data management capabilities; resource usage data; and upcoming training workshops.

Key Year One Milestones

- By end of first month of award, a meeting of the CI Awardee, incumbent and NSF will occur to begin the cyberinfrastructure transition process.
- By end of third month of award,
    - Software Development and Lifecycle Management Plan updated.
    - Initially published NHERI website, and content management software available to the other Awardees.
- By May 31, 2015, transition of the incumbent's cyberinfrastructure to the CI Awardee's operations.
- By end of eighth month of award,
    - NHERI website/portal operational.
    - Software Service Delivery Platform operational.
    - Cybersecurity Plan completed and initial implementation across Awardees.
    - Requirements for curation and archiving of research data published on NHERI website.
    - Virtual Communities of Practice organized.
- By end of year one,
    - Operational end-to-end data management infrastructure, including the NHERI data repository.
    - Working with the RAPID Facility Awardee, a data management plan for the RAPID Facility as part of the NHERI data repository.

F. Computational Modeling and Simulation Center (SimCenter) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones

NSF's vision for cyberinfrastructure in Reference 8 (Section IX) identifies advancing new computational infrastructure as a priority for driving innovation in science and engineering. Software is an integral enabler of theory, computation, experimentation, and data-enabled science and engineering, and a central component of the new computational infrastructure. The SimCenter will serve as the leader and community resource within NHERI to provide high quality, community-driven new online computational modeling and simulation software tools to advance the NHERI vision in Section II.A and the NHERI Science Plan for 2015 - 2019, increase basic research productivity, and enhance natural hazard engineering researchers' capabilities, expanding upon the natural hazards engineering community's computational needs as identified in References 2-6 (section IX). The SimCenter investment should lead to robust, reliable, usable, and sustainable software critical for potentially transforming the conduct of natural hazards engineering research, education, and innovation. The SimCenter proposal should present a compelling scientific case for its need and scope within NHERI, and its anticipated impact on the natural hazards engineering community.

The SimCenter Awardee will serve as the community catalyst and manager for engaging and supporting multi-disciplinary teams of experts in earthquake, wind, and other engineering fields, computer science, materials science, architecture, mathematical sciences, social, behavioral and economic sciences, and other related fields, as required for the task, to develop and deliver community-driven, user-tested research tools and their supporting documentation to the CI Awardee's software service delivery platform. All tools developed should be open source and delivered with appropriate interfaces (specified by the CI Awardee) to the software service delivery platform and compatible with computing resources made available by the CI Awardee. The NSF award for the SimCenter will only support development of new computational modeling and simulation tools and will provide user support for these tools. This award will not support the maintenance, further development, enhancement, and user support of existing software. The SimCenter and CI Awardees will work cooperatively together to make the SimCenter software tools productive and supportive for the user community.

The SimCenter Awardee should leverage existing cyberinfrastructure, software infrastructure, and computing resources to enable this component to focus its primary effort and budget on new software tools specifically for the natural hazards engineering community. The SimCenter will provide necessary structures and mechanisms for support, outreach, and workforce development, with a proactive approach to broadening participation, and will stimulate interactions among stakeholders for collaborative development activities. The SimCenter Awardee will deliver a portfolio of online tools that reflects a balance of new research and education capabilities for earthquake engineering research, wind engineering research, and multi-hazards engineering research. Examples of tools that might be developed are, but not limited to, the following:

- Community standards and models;
- Multi-scale, multi-physics, mechanics-based computational modeling capabilities for civil infrastructure components and systems that will reduce the reliance on physical testing to characterize the impact of natural hazards on new designs and materials;
- Validated, computational fluid dynamics software tools for wind engineering applications;
- Complex, multi-scale, multi-physics simulations of the impact of a natural hazard event on an urban city or region, integrated with visualization and decision-making tools;
- Tools to synthesize data from multiple media, e.g., digital, imaging, video, and/or remote sensing, to understand the impact of a natural hazard event on civil infrastructure and communities; and
- Lifecycle assessment tools.

Requirements

Staffing (additional): The SimCenter leadership and management should be located at the Awardee's institution. The SimCenter Director (SimCenter Awardee PI) also should have prior accomplishments in software development and lifecycle management. The leadership, management, and software development teams should have expertise and prior accomplishments in the domain science, software development and management, on-time delivery, and best practices; validation and verification; user manuals and software documentation; and user training and support. The staff should also demonstrate knowledge of recent advances and emerging technologies in cyberinfrastructure, software infrastructure, and computing resources.

Responsibilities

1. *Annual State-of-the-Art Analysis Report*, which positions the Awardee's Science and Strategic Plans and annual work plan for the SimCenter as a clear departure from the state-of-the-art so that it will not just be an incremental improvement over or duplicative of other NSF and Federally supported and existing software;
2. *Requirements Traceability Matrix,* obtained through a formal process to capture community priorities and user requirements that informs the selection of software tools developed. There must be strong scientific justification for the need for each software tool, with a description of the compelling value of the work in the context of a filling a recognized need and advanced research capability required by the natural hazards engineering research area(s), an analysis of how the proposed software compares to existing software and the limitations of these existing software, and a credible user base for the software deliverables;
3. *Process for Selection of Software Tools to be developed;*
4. *Process for Selection of Software Tool Development Teams*;
5. *High Quality and User-Tested Open Source Software Tools*, delivered to the CI Awardee's software service delivery

platform, with complete metadata and documentation, for earthquake engineering, wind engineering, and multi-hazards engineering research, in accordance with the CI Awardee's interface and delivery system requirements;
6. *Educational Modules*, adapted from computational modeling and simulation tools into open source, user friendly learning modules, with evaluation and assessment tools, appropriate for undergraduate education;
7. *Published Case Studies*, developed with researchers and educators that use the SimCenter's software tools;
8. *User Training and Support;*
9. *Annual Usability Study of Delivered Software Tools*; and
10. *ECO Program*, in addition to the responsibilities listed in Section II.C, to include:
    - Stakeholders and users actively involved in the SimCenter's activities through requirements gathering, research directions, training workshops, and updates on new advances and emerging technologies in cyberinfrastructure, computing resources, and software;
    - Virtual Communities of Practice that both contribute to and use the SimCenter's tools;
    - Research Traineeship Program for graduate students around the SimCenter's activities to develop the skills, knowledge and competencies to pursue a career in natural hazards engineering research and related fields; and
    - Monthly and Annual Community Reports, which informs users of software tools under development and recently released, training activities, and use case studies.

Key Year One Milestones

- By end of third month of award, Software Development and Lifecycle Management Plan updated.
- By end of sixth month of award,
    - An updated Requirements Traceability Matrix, which informs the year two work plan.
    - Graduate Student Research Traineeship Program implemented.
    - Virtual Communities of Practice organized.
- By end of year one,
    - Evidence of research software tools and associated documentation developed, user-tested, and delivered to the CI Awardee's software service delivery platform, and being used by an initial cohort of users.

G. Experimental Facility Component, including the RAPID Facility - Additional Awardee Requirements, Responsibilities, and Key Milestones

This section outlines the additional Awardee requirements, responsibilities, and key milestones for all EF Awardees, which includes the RAPID Facility as part of the EF cohort, and then outlines additional specific requirements, responsibilities and key milestones for the RAPID Facility only. An EF Awardee will provide the experimental resources, services, and capabilities for earthquake engineering research, wind engineering, or post-disaster, rapid response research to address the NHERI vision in Section II.A, operational goals in Section II.B, and its own Science Plan. Each EF Awardee will provide unique, technically advanced, major earthquake engineering research, wind engineering research, or post-disaster, rapid response research experimental equipment and instrumentation that do not exist elsewhere in the United States at comparable scale and testing capability. As part of the NHERI portfolio, the EF Awardees collectively will demonstrate, at the national scale, unique, complementary, and synergistic experimental, cyberinfrastructure, and education and outreach capabilities. Each EF Awardee will annually provide evidence of an active, external, and broadly inclusive user base beyond researchers and educators located at the Awardee institution. To enable an orderly award closure period, all experimental testing and use of facility resources will be completed at the EF at least two months prior to the original expiration date of the cooperative agreement.

An EF proposed with an earthquake engineering research focus does not need to be limited to the 14 NEES experimental facilities supported under the incumbent's award. This solicitation will not support the following; proposals that request the following will be returned without review:

- Fire testing equipment and capabilities;
- Experimental capabilities that do not support earthquake engineering or wind engineering research;
- With the exception of the RAPID Facility, the establishment of a new laboratory, acquisition of new/replacement major experimental equipment, major equipment refurbishments and upgrades, capital improvements to existing laboratory buildings and space, and construction of new buildings;
- A distributed facility, with resources owned, housed, and/or maintained by multiple organizations;
- A facility with any equipment that can only be accessed or used outside the United States;
- A facility with the primary focus and capability for development of advanced experimental testing algorithms and techniques; and
- A facility for long-term instrumented structures and/or field sites.

Requirements

1. *Location:* The EF Awardee's experimental resources will be housed within the United States at a single academic institution. EF resources may be operated outside the United States for short-term periods to support research. If the EF is part of a larger institutional laboratory complex and its associated budget and accounting, then its personnel effort, resources, and budget under the NHERI award are to be accounted for and tracked separately from the larger laboratory administration. (Exception: Shared-use instrumentation acquired post-award as the result of an annual Council work plan may be housed and maintained by one EF Awardee on behalf of the network.)
2. *Staffing (additional):* The EF Director (EF Awardee PI) also should have expertise in facility operations and should be the main point of contact for users. The EF Awardee should have sufficient staff and technical expertise to support daily operations, maintenance and calibration, experimentation, scheduling with the NCO's Facility Scheduling Protocol, and users, and should include a designated safety officer and an information technology (IT) specialist to support data management, telepresence, and cybersecurity.
3. *EF Resource Allocations for NSF-supported Awards:* The Awardee will proactively market its resources and capabilities to lead to significant annual facility resource use by NSF-supported research and education awards, to justify its role and continued NSF support as a national, multi-user EF. Sufficient time will be allocated annually for each facility resource to accommodate NSF-supported awards, user training, and participation in the NCO's REU site and Summer Institute programs.
4. *Facility Resource Scheduling:* The EF Awardee will delegate daily scheduling of facility resources to the NCO Facility Scheduling Protocol, with the EF scheduler providing input into the scheduling process.
5. *User Fees/Recharge Rates:* The EF Awardee will maintain institutionally-established user fees/recharge rates during the entire award period for the resources and services that will be available to users.
6. *Annual Institutional Laboratory Inspection for EH&S,* with corrective actions promptly taken.

Responsibilities

1. *Experimental Resources:* Provide, manage, operate, and maintain fully functioning and calibrated experimental resources for earthquake engineering or wind engineering research, to include, as applicable for the EF: major experimental equipment; instrumentation; sensors; data management infrastructure; telepresence; remote equipment operations (as applicable for the

equipment); Internet and Internet2 connectivity; equipment for EH&S protection; specimen handling and transport equipment; specimen construction, staging, and demolition areas; software integral to testing; and other services and tools necessary for experimentation. There should be sufficient resources for users to conduct their experimental work and training safely and efficiently. Each EF Awardee is responsible for physical laboratory equipment and cybersecurity. Each EF Awardee will maintain an EH&S compliant facility. Each EF Awardee will be responsible for insurance and indemnification;

2. *Standard Experimental Protocols:* Provide standard experimental protocols, so that users can efficiently write proposals for using facility resources and efficiently plan and conduct experiments;
3. *Data Management Infrastructure:* Implement an end-to-end data management plan for the facility, which meets the CI Awardee requirements for data and metadata protocols and formats, archiving, curating, retrieval, automatic upload of data during experimentation to the NHERI data repository or process for upload of validated field data, data curation at the source as feasible, and cybersecurity. The data management plan and EF use should be supported through cyberinfrastructure and cybersecurity compliant with institutional and CI Awardee policies;
4. *Facility Financial Operating Plan,* which is the annual financial plan for operating the EF showing sufficiency of resources and staffing through costs assigned to the NSF NHERI award and costs to be recovered from users through institutionally-established user fees/recharge rates; and
5. *User Support,* to include:
    - Identified staff for user support;
    - User training and support, with at least one annual on-site training workshop;
    - On-site user support during all phases, such as information needed for proposal writing, planning, specimen construction, experimentation, specimen removal/demolition, and data processing, and office and meeting space; and
    - Information to the CI Awardee for posting on the NHERI website, but not limited to: (a) institutionally-established user fees/recharge rates associated with testing at the EF, (b) an itemized inventory of all EF resources, capabilities, and testing algorithms, (c) standard experimental protocols, (d) list of EF personnel and safety officer contact information, (e) EF location and map, (f) procedures for EF access and use, (g) EF user and safety manuals, (h) data management information and requirements, (i) recent research projects conducted at the EF, and (j) user training workshop dates and resources.

Key Year One Milestones

- By end of second week of award (except for the RAPID Facility by this date),
    - Submission to the NSF, from each EF Awardee's Authorized Organizational Representative, certification that on the start date of the award, all facility resources listed in the proposal are fully operational and the facility is in compliance with institutional EH&S policies, and complete list of the institutionally-established user fees/recharge rates for the EF.
- By end of fourth month of award,
    - Software Development and Lifecycle Management Plan updated.
    - Complete user support information provided to the CI awardee for the NHERI website (except for the RAPID Facility by this date).
- By end of sixth month of award,
    - EF scheduling implemented with the NCO.

Year One Upgrades (Excluding the RAPID Facility)

NSF may provide additional support to EF Awardees based on prioritization, justification of need, and availability of NSF funding for the following; this support does not replace the EF Awardee's responsibility to provide a fully operational and EH&S compliant facility on the start date of the award:

- Minor equipment and staff training to improve facility EH&S;
- Refresh and upgrades to the data management infrastructure (hardware and software);
- New and/or refreshed telepresence equipment to enable web-based viewing of the facility and major experiments; and
- Equipment to improve project throughput, e.g., equipment for specimen transport within the facility.

Additional RAPID Facility Awardee Requirements, Responsibilities, and Key Milestones for Years One and Two

For decades, NSF has supported researchers to gather perishable research data immediately following a natural hazard event in the United States or abroad. These awards have captured data on the impacts of an event on the natural, constructed, and social environments and the response and recovery processes. This data has been used in subsequent research to advance knowledge for improved preparedness, mitigation, emergency response, and recovery strategies. The RAPID Facility will provide resources for quick field deployment globally to support perishable research data collection by investigators following an earthquake or windstorm event. The collected data will be curated and archived in the NHERI data repository. This facility must be designed to meet the roles, requirements, and responsibilities of all Awardees, EF Awardees, and the RAPID Facility Awardee. This Awardee will work closely with: the CI Awardee to develop and implement the data management plan required to accommodate RAPID Facility data in the NHERI data repository, the NCO Facility Scheduling Protocol for scheduling facility resources, and the community to develop and make this facility operational by the end of the second year of the award. The RAPID Facility Director will convene an External Steering Committee during years one and two to provide advice and guidance during facility development. Planning for this facility should include development of a consensus-based Community Research Team Deployment Plan (CRTDP) and consideration of two types of user support programs, such as:

- *Facility Deployment Program*: Using the CRTDP process, the Awardee will form and support coordinated team(s) for quick deployment following an event of significant research interest to the broad natural hazards engineering community. The perishable data collected must be publicly available in the NHERI data repository in the timeframe specified in the NHERI data sharing policy established by the Council.
- *External Deployment Program*: The Awardee will support data collection following an event of more focused research interest by team(s) of investigators receiving NSF-supported awards for perishable data collection, such as RAPID awards or supplements to existing NSF awards. Data collected from these NSF-supported awards must be publicly available in the NHERI data repository in the timeframe specified in the NHERI data sharing policy established by the Council.

Requirements (additional)

1. *Staffing (additional):* The RAPID Facility Director (Awardee PI) also should have demonstrated expertise in earthquake and/or windstorm rapid response research investigations and use of information technology. The staffing should demonstrate expertise needed to maintain, operate, and deploy facility resources, conduct field deployment and logistics, collect and manage facility data, and support users.
2. *External Steering Committee:* The membership will be external to the Awardee. The Awardee will budget for all costs to support this committee.

Responsibilities (additional)

1. *Facility Deployment Program:* The RAPID facility will be responsible for all field deployment logistics, including support required for equipment transport and field permits, in field user support as needed, and travel logistics and costs for deployed facility staff and research teams.
2. *External Deployment Program:* The research team's travel, logistics, RAPID Facility equipment transport, and permits will be supported through a separate NSF award. If the research team requires in field support, then the RAPID Facility will support its staff travel costs through its Awardee budget.
3. *User Training:* Beginning in year two, and in all subsequent years, there should be frequent opportunities provided for community training on use of the RAPID Facility resources so that there are trained researchers who can quickly deploy facility resources.

Key Milestones (additional)

- Within the three months of award,
  - External Steering Committee formed and held its first meeting.
- By end of year one, completion of the following facility documents; these documents will undergo a merit review organized by NSF, and continued development of this facility in year two will be subject to NSF approval,
  - Updated Science Plan for this facility, to include justification for the equipment with reference to equipment that are currently available at other organizations or otherwise accessible through collaborations, partnerships, or cyberinfrastructure.
  - CRTDP.
  - Updated plans for operations in accordance with Section II.C and this section, plus an acquisition, procurement, and commissioning plan for facility resources in year two.
  - Working with the CI Awardee, a data management plan to accommodate the RAPID Facility's data in the NHERI data repository.
- By end of year two,
  - All facility resources procured, commissioned, and operational.
  - RAPID Facility data accommodated as part of the NHERI data repository.
  - User fees/recharge rates established by the Awardee and posted on the NHERI website.
  - Initial cohort of researchers trained and deployment-ready.
  - Submission to NSF, from the Awardee's Authorized Organizational Representative, certification that the RAPID Facility is fully operational and in compliance with institutional EH&S policies.
  - Compliance with All Awardee, EF Awardee, and Rapid Facility Awardee requirements and responsibilities outlined in Section II of this solicitation.

H. General Information and Frequently Asked Questions

For additional information on the current NEES infrastructure, this solicitation, and NSF policies, please contact the Lead Cognizant Program Officer listed in this solicitation. All questions received will be responded to only through a Frequently Asked Questions (FAQ), to be posted on www.nsf.gov. An initial FAQ is included in Section X, Appendix. Questions will not be individually answered. Questions submitted less than three weeks prior to the full proposal deadline will not be answered.

Informational Webcast/Webinar

NSF intends to hold an informational webcast/webinar prior to the due date of the Letter of Intent. The date and further information about the webcast/webinar will be distributed through NSF's delivery service at https://public.govdelivery.com/accounts/USNSF/subscriber/new?preferences=true#tab1.

III. AWARD INFORMATION

The anticipated funding amount of $62,000,000 is the estimated total for up to five years for up to ten awards (ten Awardees). The table below shows the anticipated annual base budget support for each Awardee, contingent upon the annual budgets of NSF, the annual performance of the Awardee, and the extent of utilization of Awardee resources by NSF-supported research and education awards. For the RAPID Facility Awardee, a one-time budget increase of up to $1,200,000 in year two will be available for new equipment acquisition and commissioning, contingent upon the outcome of the year one merit review and NSF approval.

Additional support, either through an increase in the base budget or as a supplement, may be provided as follows, contingent upon annual appropriations for NSF and NSF approval:

- For Experimental Facility Awardees in year one to support upgrades as outlined in Section II.G of the solicitation (excluding the RAPID Facility Awardee).
- For all Awardees, as appropriate, to support annual Council work plan activities.
- For Experimental Facility Awardees during years one through five to repair equipment damaged during testing.

Anticipated Annual Support					
Awardee	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**
Network Coordination Office award base budget	$700,000	$900,000	$900,000	$900,000	$700,000
Cyberinfrastructure award base budget	$2,400,000	$2,700,000	$2,900,000	$2,900,000	$2,800,000
Computational Modeling and Simulation Center award base budget	$2,000,000	$2,200,000	$2,300,000	$2,200,000	$2,200,000
Experimental Facilities, total amount for up to six award base budgets	$4,800,000	$5,100,000	$5,400,000	$5,400,000	$5,400,000
Post-Disaster, Rapid Response Research Facility award base budget	$500,000	$1,800,000	$600,000	$600,000	$600,000
Potential Additional Support, total for all Awards: Year One	$1,600,000	$300,000	$400,000	$500,000	$300,000

Experimental Facility Upgrades, Annual Council Work Plan Activities, and Experimental Facility Equipment Repairs					
Anticipated Total Funding for all awards	$12,000,000	$13,000,000	$12,500,000	$12,500,000	$12,000,000

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- 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.

Who May Serve as PI:

The PI must be a full-time employee of the lead institution by the start date of the NSF cooperative agreement award.

Limit on Number of Proposals per Organization: 2

An academic institution may submit up to two proposals as the lead institution, but may not submit more than one proposal as the lead institution in any one of the following four proposal categories:

1. Network Coordination Office (NCO),
2. Cyberinfrastructure (CI),
3. Computational Modeling and Simulation Center (SimCenter), and
4. Experimental Facility (EF), which includes the Post-Disaster, Rapid Response Research (RAPID) Facility.

A full proposal involving more than one organization must be submitted as a single administrative package from the lead institution; collaborative full proposals with multiple administrative packages will not be accepted and will be returned without review. If the Principal Investigator of a full proposal leaves or transfers to another institution during the review process or after an award is made, the proposal/award remains with the lead institution. Additionally, the lead institution cannot be changed after submission of the full proposal. National laboratories and private sector companies, as well as non-U.S. institutions, may participate in NHERI award activities using their own resources and cannot receive NSF support from an award made under this solicitation; however, this shall not be interpreted to prohibit purchases, services, or sales contracts/agreements with these entities. A proposal for an EF, including the RAPID Facility, must be a single academic institution proposal with all proposed facility resources owned, operated, and maintained by the academic institution and located within the United States to facilitate access by NSF-supported users.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as Principal Investigator (PI) or co-PI in no more than one proposal submitted in response to the full proposal deadline. Applicants are responsible for ensuring that no individual is listed as PI or co-PI in more than one proposal. If an individual is included as PI or co-PI in two or more proposals submitted by the full proposal deadline, then the first proposal submitted, based on the FastLane system time stamp, will be deemed the one allowable submission. All subsequent proposals that include the individual as PI or co-PI will be returned without review.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent*(required)*:

A Letter of Intent (LOI) must be submitted by the Sponsored Projects Office (SPO) of the submitting institution by the LOI due date. Proposals received for this competition that are not preceded by a LOI from the SPO of the submitting institution will be returned without review.

Include the following information: (a) name of lead institution, (b) names of participating organizations, and (c) names and organizational affiliations of the PI, co-PIs, Other Senior Project Personnel, Leadership and Management Team, and Other Project Personnel. Also include the following information, as appropriate:

- For the Network Coordination Office, describe the network coordination strategy and major activities.
- For the Cyberinfrastructure, describe the major cyberinfrastructure resources and services to be provided.
- For the Computational Modeling and Simulation Center, describe the types of research and educational software tools to be developed.
- For an Experimental Facility, including the RAPID Facility, describe the major experimental equipment and capabilities to be provided.

For additional information regarding LOI submission please see the Grant Proposal Guide (GPG Chapter I.D.1).

After submission of the LOI, the lead institution cannot change, as a full proposal may be submitted only by a lead institution that has submitted a complete LOI by the LOI due date. With the exception of the lead institution, all other participants listed on a

submitted LOI may be changed at any time prior to the full proposal submission deadline, and these changes do not require notification to NSF. NSF will use the LOI only to prepare for the proposal merit review process.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is required when submitting Letters of Intent
- A Minimum of 0 and Maximum of 4 Other Senior Project Personnel are allowed
- A Minimum of 0 and Maximum of 30 Other Participating Organizations are allowed
- Leadership and Management Team (name, organizational affiliation) is required when submitting Letters of Intent
- Additional Project Personnel (name, organizational affiliation) is required when submitting Letters of Intent
- Additional Project Personnel (name, organizational affiliation) is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is not allowed

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- 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: (http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf). 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) 292-7827 or by e-mail from nsfpubs@nsf.gov.

Important Proposal Preparation Information: FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

A full proposal may be submitted only by a lead institution that has submitted a complete LOI by the LOI due date. A full proposal submitted from an organization that has not submitted a LOI by the due date will be **returned without review**. Due to the complexity of the proposals being submitted, use of FastLane to prepare and submit the full proposal is strongly encouraged.

The full proposal must conform to the guidelines specified in the NSF Grant Proposal Guide (GPG) or the NSF Grants.gov Application Guide (as discussed above), **and** the additional full proposal preparation instructions below, which include deviations from the NSF GPG and the NSF Grants.gov Application Guide as follows;

- The Project Description must not exceed 45 pages.
  - Section 1, Summary Tables, is not part of the 45-page limit.
  - Sections 2-17 are part of the 45-page limit count.
  - The page limit shown with each section heading is a guide for that section; proposals may deviate from the section page limits; however, the total number of pages in the Project Description for Sections 2-17 must not exceed the 45-page limit.
- The Project Description has a specified format and order, with section headings that must be followed.
- The Postdoctoral Mentoring Plan is only required for SimCenter proposals, if postdoctoral researchers will be included. Postdoctoral researchers will only be supported on the SimCenter award.
- Additional information is specified for inclusion in the Facilities, Equipment, and Other Resources section.
- Additional information is specified for inclusion in the Special Information and Supplementary Documentation section.
- Additional Single Copy Documents must be provided.

A full proposal that is not compliant with the GPG or the NSF Grants.gov Application Guide and the additional full proposal preparation instructions in this section will be returned without review. The Appendix provides a checklist for proposers to check for compliance prior to submission.

COVER SHEET

- Start Date: March 1, 2015
- Title of Proposed Project: NHERI Component Name (For "Component Name" use either "Network Coordination Office," "Cyberinfrastructure," "Experimental Facility," or "Computational Modeling and Simulation Center") 2015 - 2019. Example: NHERI Network Coordination Office 2015 - 2019
- NSF Organization Unit: CMMI - NEES Operations
- Fund Code: 7470

PROJECT DESCRIPTION

General Project Description Preparation Instructions

- Tables and lists in the Project Description may be in a smaller type but proposers are responsible for ensuring that the type is readable when the page is printed.

Proposers should refer back to Section II, Program Description, to help guide their proposal preparation.

- Proposals must not include names of committee members, chairs, and organizational affiliations. Proposals that include this information will be returned without review and will not receive further consideration.

- Resources and services that will be provided by other U.S. or international partners who are not requesting support may be named in the Project Description for completeness, but the detailed role and contribution to the proposed project should be described in the Facilities, Equipment and Other Resources section and must not include any quantifiable financial information.

The Project Description section of the full proposal must contain the information specified below, in the order listed, using the section numbering and headings shown below.

Section 1. Summary Tables (all proposals - not included within the Project Description Page Limit)

At the start of the Project Description, the following three tables must be provided (proposals must not include any introductory paragraphs preceding these three tables in the Project Description):

- Table 1, "List of Participating Organizations," listing all organizations participating in the proposed component (including consultant organizations), whether or not requesting support. Use the following column headings: name of organization, location (city, state, and country only if not in the U.S.), Internet domain name (e.g., abcxyz.edu), and total year-one requested support (if no support requested, then state "none"). **Proposals that include participating organizational names anywhere within the proposal and do not list these organizations in Table 1 will be returned without review and will not receive further consideration.**
- Table 2, "List of Supported Project Personnel," listing all project personnel who request support in the NSF budget whether at the lead institution or at a partner organization). Use the following column headings: full name (last, first), professional title, organizational (and departmental, where applicable) affiliation, organizational Internet domain name (e.g., abcxyz.edu), project position title, year one level of effort (number of months, e.g., two months), and up to a three-sentence description of the responsibilities of each individual. In the description of the responsibilities, include if the position is leadership or management position. All leadership and management positions must have individuals named. For other positions, if the name of an individual is not known at the time of proposal submission, enter "To Be Determined" in the table and the date when that position will be filled. Do not include in the table the names of secretarial staff or any committee members or committee chairs, as all committees, including the NIAC, User Forum, and RAPID Facility External Steering Committee, are to be populated after the award is made by NSF. **Proposals that do not identify the names for all leadership and management positions in Table 2 and that include names of individuals to receive NSF support anywhere the proposal but do not list these names in Table 2 will be returned without review and will not receive further consideration.**
- Table 3, "List of Other Project Personnel," listing all project personnel participating in the award but not requesting support. Use the following column headings: full name (last, first), professional title, organizational (and departmental, where applicable) affiliation, organizational Internet domain name (e.g., abcxyz.edu), and up to two-sentence description of role in the project. **Proposals that include other project personnel names anywhere in the proposal and do not list these names in Table 3 will be returned without review and will not receive further consideration.**

Section 2. Broader Impacts *(all proposals, one page)*

Section 3. Results from Prior NSF Support *(all proposals, up to five pages)*

Section 4. Science Plan *(all proposals, up to three pages)*

Section 5. Strategic Plan for Operations *(all proposals, up to four pages)*

Section 6. Marketing and Broadening Participation Plan for Developing the User Base *(all proposals, one page)*

Section 7. Organizational Structure, Staffing, and Diversity *(all proposals, up to two pages).*

Present an organizational chart that shows the following: full first and last names for each individual, organizational affiliation and organizational title, position title/role within the proposed project, lines of authority, and year-one full-time equivalent (FTE) person-month effort (e.g., two months) for those included in the NSF budget request. Identify leadership and management positions. Indicate existing personnel and personnel to be hired post-award. Show the reporting lines to internal groups at the lead institution responsible for award oversight and lines of interactions with the other NHERI Awardees, Governance, Users, and broader natural hazards engineering community. Describe why this structure and the project team's qualifications will be effective for leading, managing, and implementing the project. Discuss the plan for developing staffing inclusive of groups underrepresented in STEM.

Section 8. Project Management and Performance Assessment *(all proposals, up to three pages)*

Describe how the lead institution will implement project management and performance assessment, including oversight of subawards/subcontracts. For the PI and co-PIs on the proposal that have had prior NSF support during the past five years as part of a large facility, cyberinfrastructure, software development, or center/institute award with an annual average award budget of $500,000 or greater, cite each NSF award number, title, duration and award amount and provide a summary of the lessons learned from these award(s) that inform(s) the proposed project management and performance assessment strategy.

Section 9. Work Breakdown Structure (WBS) and Budget Allocations (*all proposals, up to two pages)*

Present the WBS to level 3 (i.e., 1.2.3) for the entire five-year scope and the associated budget for each WBS element. Using the WBS, provide the budget allocation for each element, rolling up the budget at each level. Include both direct and indirect costs for each WBS element. The budget allocations must total to the cumulative, five-year FastLane request budget request. The WBS dictionary will be provided in the Special Information and Supplementary Documentation section.

Section 10. Governance Interactions (*all proposals, one page)*

Describe how the NHERI component will interact with the Governance structure. Describe up to three NHERI-wide policies and procedures, up to three committees, and up to three cross-Awardee activities that would be beneficial to the operations of the proposed component.

Section 11. Component-Specific Implementation *(all proposals, up to 10 pages)*

Network Coordination Office (NCO proposals only)

Describe how the NCO will be implemented to meet the requirements and responsibilities in Sections II.C and II.D:

- Governance Support: Council, NIAC, User Forum, and Committees.
- Facility Scheduling Protocol.
- Community Research and Education Agendas.
- Strategic Partnerships.
- Education and Community Outreach Program.

Cyberinfrastructure (CI proposals only)

Describe how the CI will be implemented to meet the requirements and responsibilities in Sections II.C and II.E by providing the following information:

- Design, development, operations, and management of the cyberinfrastructure, including extensibility of the data repository to take in related content from external sources and to enable interoperability with other repository systems. The Requirements Traceability Matrix must be included in the section on Special Information and Supplementary Documentation.
- Description of the community-driven, production-quality cyberinfrastructure, including extensibility of the data repository to take in related content from external sources and to enable interoperability with other repository systems.
- Analysis of and gaps in the current services and capabilities of the incumbent's cyberinfrastructure for earthquake engineering, and how the proposed cyberinfrastructure addresses those gaps for the scope of the cyberinfrastructure provided. If the HUBzero® technology, which underlies the NEEShub, is not proposed for the new cyberinfrastructure platform, provide a cost/benefit analysis between the using the incumbent's platform versus the proposed platform.
- Table of major deliverables, which identifies those that can be transitioned directly from the incumbent or the software tool's author and those that are new and either will require development or can be leveraged directly from other resources. Include the milestone date for when each deliverable will be available for use by the user community. Identify those deliverables that will require negotiation with the authors of those tools for use in NHERI.
- A table positioning the proposed cyberinfrastructure in the context of ongoing cyberinfrastructure, large facility, digital data preservation, and software projects supported by NSF and other Federal agencies.
- Plan for annual usability study.
- Education and Community Outreach Program.

Computational Modeling and Simulation Center (SimCenter proposals only)

Describe how the SimCenter will be implemented to meet the requirements and responsibilities in Sections II.C and II.F by providing the following information:

- State-of-the-art analysis, which positions the vision and activities for the SimCenter as a clear departure from the state-of-the art and a value added resource for natural hazards engineering research and education.
- Process for selecting software tools to develop, including community priorities. The Requirements Traceability Matrix will be included under the section Special Information and Supplementary Documentation.
- Process for selection of software tool development teams.
- Planned computational modeling and simulation software tools, educational modules, and case studies. For the computational modeling and simulation tool with the highest development budget in year one, describe the tool in detail and its specific software development and lifecycle management. Describe how this tool could be adapted to an educational module for undergraduate education and a case study.
- Plan for interface with the CI Awardee to deliver tools to the software service delivery platform.
- Plan for assessing software tool quality, performance, and utilization.
- User training and support services.
- Plan for annual usability study of delivered software tools.
- Education and Community Outreach Program.

Experimental Facilities, including the RAPID Facility (EF proposals only)

Describe how the EF will be implemented to meet the requirements and responsibilities in Sections II.C and II.G by providing the information requested below. Additional information will be included in the Facilities, Equipment, and Other Resources section of the proposal. The RAPID Facility should describe its initial plans through the information requested below; this information will be updated during the year one planning process.

At the start of this section, include two summary tables; these tables should match the resources in the tables listed in Section 4, Science Plan. These two tables are not required for RAPID Facility proposals.

- Prospective Table, with the rows to be each major experimental resource and the column headings to be the schedule planned for year one (assume start date of March 1, 2015) for each major resource (based on a 250-day year): the number of days allocated for use by NSF-supported awards; number of days allocated for use by sources other than NSF; number of days allocated for routine maintenance and calibration; and number of days allocated for user training. Provide a list of NSF awards that have already been identified to use the facility in year one, and the anticipated days allocated for facility use.
- Retrospective Table, with the rows to be each major experimental resource, and the column headings to be by year (for each of the past three years, October 1, 2011-September 30, 2014, based on a 250-day year), the number of days that each major equipment: (a) was used for specimen construction, instrumentation, testing, and demolition by all sources of support, (b) underwent routine maintenance and calibration, (c) underwent repair/replacement, and (d) was not in use.

Provide the following information:

- Location of the EF major experimental resources.
- Description of the EF resources and services provided. Describe the Internet and Internet2 connectivity. Discuss if testing will require custom software to be developed by either the EF or the user. For RAPID Facility proposals, in lieu of the above, describe the plan for developing this EF during years one and two, including preliminary information on the type of resources and services to be provided (e.g., equipment, software, and staffing).
- End-to-end data management infrastructure and plan.
- Description of the standard experimental protocol(s) and specifications.
- User support services.
- A table that benchmarks the EF with comparable experimental facilities in the United States, and if applicable, globally (up to one page).
- Up to three major accomplishments in supporting external users in using EF resources for research and/or education within the past three years. Summarize results of user surveys conducted for the EF within the past three years, and any corrective actions implemented. List three research publications within the past three years that cite use of the EF and data generated from using EF resources. For RAPID Facility proposals, in lieu of the above, provide evidence of post-disaster, rapid response research investigations conducted by EF staff and their roles in these investigations, referencing reports and data from these investigations in the public domain.

- Using a recent project conducted under the EF's standard experimental protocol (or for the RAPID Facility, a major post-disaster, rapid response research investigation conducted), provide a description of the EF resources that would be used, schedule, end-to-end data management workflow, and the associated services and user support from planning to completion.
- Plan for maintenance, calibration, minor equipment refresh, and complying with EH&S requirements. Include the following: facility safety and security features and types of institutional laboratory inspections conducted, frequency of inspections, and how corrective actions are resolved.
- Plan for how the EF will work with the NCO Facility Scheduling Protocol and scheduler.
- Plan for annual EF resource availability for NSF-supported users. Describe any challenges in availability of the major experimental resources for use by NSF-supported awards.
- Description of major equipment failures or losses within the past three years exceeding $20,000 each in total for clean-up and repair/replacement, the total cost for each failure/loss, sources of support for all costs, and the duration of time from damage/failure to restored functionality for research use. (This is not required for RAPID Facility proposals).
- Education and Community Outreach Program.
- Table, which prioritizes potential year one upgrades, listing the requested item, justification for the item, estimated total cost per item (combined direct and indirect costs for acquisition, installation, and commissioning), and planned date of operational readiness. (This is not required for RAPID Facility proposals).

Section 12. Project Schedule *(all proposals, up to two pages)*

In table format, present the five-year schedule for major project activities, with milestones for initiation and completion of major deliverables. Include the key milestones listed in Section II for the proposed component.

Section 13. Year One Work Plan *(all proposals, up to three pages)*

Present a table with the following column headings: WBS element number and name, strategic goal, objective, brief activity description, activity budget (total direct and indirect costs) deliverable, milestone date, performance metric, performance metric target, and responsible organization/staff name(s). The total budget should total to the year one NSF FastLane budget request.

Section 14. Cybersecurity Plan - Summary *(all proposals, up to one page)*

Section 15. Risk Management Strategy and Plan, including Risk Assessment Matrix *(all proposals, up to two pages)*

If relevant to the resources provided, describe how the Awardee will be compliant with the International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR). If ITAR and EAR are not applicable, then indicate as such.

Section 16. Software Development and Lifecycle Management Plan *(all proposals, up to three pages)*

Section 17. Other Information *(optional for all proposals, up to two pages)*

Provide any additional information that the lead institution believes will be of assistance in evaluating the proposal but does not fit into any of the sections defined above or in the Facilities, Equipment, and Other Resources and Special Information and Supplementary Documentation sections.

Facilities, Equipment, and Other Resources

Include the descriptions below; however, the descriptions must not include any quantifiable financial information about the resources that will be made available as a NHERI resource during 2015 - 2019.

For all proposals:

- Description of resources and services to be provided that are not requesting support.
- Description of the space and resources that will be made available for project headquarters project and staffing.

For EF proposals (for the RAPID Facility, as applicable):

- One-page floor or site plan of the EF with dimensions showing the location of major experimental and safety equipment, secured storage areas, specimen staging areas, doorways, loading docks, cranes and/or other specimen handling equipment, control room, perimeter security, and meeting and office space. If the EF is part of a larger laboratory space, clearly indicate the boundaries of the EF on the plan.
- Up to eight photos of the proposed EF, not to exceed two pages, showing the EF resources to be provided, and, as pertinent, specimen construction/staging areas. Annotate the photos as needed to define the laboratory/site space and highlight safety and security equipment and features.
- EF network diagram, including Internet and Internet2 connectivity and capacity and data flow from source to local data repository and from source to NHERI data repository.
- Facility Financial Resource Operating Plan: Provide an EF Inventory Table, with the rows to be the "Facility Resources" itemized for all equipment/experimental resources, staff positions (e.g., laboratory technician), and other resources that will be available to users and the column to be "Source of Support" for each EF resource (indicate either "NHERI Award" or "Institutionally-Established User Fees/Recharge Rates"). Do not include quantifiable financial information in this table.
- Facility Data Summary Table, using the following format:

1	Facility Name	
2	Host institution name	
3	Facility location (campus building/location and/or off-site location)	
4	Facility PI/Director Name	
5	Total number of facility staff FTE person-months in the year one NSF budget request	
6	Facility requested budget, five-year total	
7	Facility requested budget, year one	
8	List of major equipment to be supported, with year of procurement and year of initial operations	
9	Estimated remaining useful life (in years) of major equipment and the source(s) of estimate	

10	Telepresence equipment and capabilities	
11	Major facility-specific software (e.g., data management, controller algorithms, hybrid simulation, data visualization tools, etc.)	
12	Number of NSF awards (cite the specific NSF seven-digit award numbers) that tested using the major equipment within the past three years, by major equipment	
13	Number of internal users within the past three years (list by major equipment and year)	
14	Number of external users within the past three years (list by major equipment and year)	
15	List of major equipment that is likely to need major overhaul or replacement during the five-year award period	
16	Date(s) of most recent laboratory inspection and major equipment condition assessment report(s), summary of findings, and corrective actions	
17	Date(s) of most recent equipment, sensor and instrumentation calibrations	
18	Date(s) of most recent technology refresh, including sensors, data acquisition, computers, and servers	
19	Number and types of facility accidents within the past three years and summary of corrective safety actions taken to prevent future occurrences	
20	Date of most recent on-site user training workshop and number of attendees	
21	Any other data that the facility would like to provide	

Special Information and Supplementary Documentation

This section must include the information requested below in Sections A through H, using the headings and page limits shown below, and must not include any other additional information. If a particular section is not applicable, include the Section heading and write below "Not Applicable."

A. Work Breakdown Structure (WBS) Dictionary (*all proposals, up to eight pages)*

Provide the WBS dictionary for each WBS element listed in the Project Description.

B. Evidence of Lead Institution Capability *(all proposals, up to five pages)*

Provide documentation of the lead institution's internal business and financial capability to manage the award within the lead institution and oversee subawards to partner organizations.

- Oversight lines of authority: Describe the role of the Awardee operations and the reporting lines of authority of the PI within the lead institution, referencing the organizational structure presented in the Project Description for lead institution oversight. Describe how these lines of authority will be used to provide Awardee oversight for all aspects of the project, including subaward management and procurement.
- Business and financial management and audit control: Provide the structure and plan for implementing and monitoring business systems and internal controls across the project for financial management, program income, accounting, property standards, equipment standards, procurement standards, reporting, and records.
- Human resources: Describe the human resource system(s) that will be used by the lead institution for recruiting project personnel and evaluation of its employees' performance on the project. Provide the lead institution's minimum qualifications for selection of all project leadership and management positions, regardless of the employer of the individual that will fill the position.
- If an institution is submitting both NCO and EF proposals, describe how the institution will manage open and equal access to its EF through the NCO's Facility Scheduling Protocol that is transparent to NSF and the user community.

C. Year One Cyberinfrastructure Start-up and Transition Plan *(CI proposals only, up to eight pages; all other proposals enter "Not Applicable")*

Present all start-up and transition activities in a separate, five-month detailed work plan in tabular format (use the year one work plan format described above). Indicate resources that will be transitioned from the incumbent and resources that must be developed during the transition period. Describe the management of the start-up and transition, how continuity of service in cyberinfrastructure operations will be provided, and the criteria that will be used to report to NSF the exit from start-up and transition to full operations.

D. Environmental Considerations *(EF proposals only; all other proposals enter "Not Applicable")*

If a proposed EF might have an environmental impact, provide sufficient information to assist NSF officials in assessing the environmental consequences of supporting the EF. Discuss whether or not there are environmental considerations, the nature of the environmental considerations, and if permits might be needed, a short description of the types of permit needed. If this information is not pertinent for a proposed facility, then state "Not Applicable."

E. Letters of Collaborative Arrangements *(all proposals, if applicable; otherwise enter "Not Applicable")*

Include letters of collaborative arrangements from individuals or organizations that are integral parts of the proposed project but are not requesting support. This would include a subset of organizations named in Table 1, "List of Participating Organizations," and the collaborators listed in Table 3, "List of Other Project Personnel," in the Project Description. Letters of collaboration should focus solely on affirming that the individual or organization is willing to collaborate on the project as described in the Facilities, Equipment, and Other Resources section. No additional text may be included. The template that **must** be used for the preparation of letters of collaboration is provided below.

Letters of collaboration must not be provided from any individual designated as a Principal Investigator, co-PI or senior personnel. Letters of collaboration must not be submitted from any individual or organization that requests financial support.

Each letter of collaboration **must** be specific for the proposal submitted and must be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they **must** be included at the time of the proposal submission. They must not be sent directly to NSF, as NSF will not add them to the proposal or include them in the merit review process. ***Letters deviating from this template will not be accepted and will result in the proposal being returned without review.***

> **Template to be used for Letters of Collaboration**
>
> To: NSF Program Solicitation NHERI 2015 - 2019
>
> From: _____
> (*Printed name of the individual collaborator or name of the organization and name, position, and affiliation of the official submitting this memo*)
>
> By signing below (or transmitting electronically), I acknowledge that I am listed as a collaborator on this proposal, entitled _____ (*Use the Proposal Title on the proposal Cover Sheet*) with _____(*PI name*) as the Principal Investigator. I agree to undertake the tasks assigned to me or my organization, as described in the Project Description or Facilities, Equipment, and Other Resources section of the proposal, and I commit to provide or make available the resources specified therein.
>
> Signed: _____
>
> Printed Name: _____
>
> Organization: _____
>
> Date: _____
>
> **Please note that letters of support from individuals or organizations who are not named in Tables 1 or 3 in the Project Description are not allowed. Inclusion of such letters will result in the proposal being returned without review.**

F. Biographical Sketches of Additional Project Personnel *(all proposals, if applicable, up to 10 additional project personnel; otherwise enter "Not Applicable")*

Two-page biographical sketches, following the NSF GPG format, for up to ten additional project personnel requesting support, may be included in this section.

G. Requirements Traceability Matrix *(CI and SimCenter proposals only, not to exceed 10 pages; otherwise enter "Not Applicable")*

H. Vendor Quotes to Support the Budget Justification *(all proposals, if applicable; otherwise enter "Not Applicable")*

Single Copy Documents. Provide the following as single copy documents:

- **Lists of Participating Organizations and Project Personnel.** Submit the "List of Participating Organizations" (Table 1 in the Project Description), "List of Supported Project Personnel" (Table 2 in the Project Description) and "List of Other Project Personnel" (Table 3 in the Project Description) together as a text-searchable single Portable Document Format (PDF) file in FastLane in the single copy section of the full proposal.
- **Conflict of Interest List.** Provide a list, in a single alphabetized table, alphabetized by last name, with the full first and full last names and organizational affiliations of all individuals with conflicts of interest for all project personnel who request financial support in year one. Conflicts to be identified are the following: (1) Ph.D. dissertation advisors and advisees, (2) collaborators or co-authors, including postdoctoral researchers, for the past 48 months, (3) co-editors within the past 24 months, (4) spouse or other relatives, and (5) any other individuals with whom, or institutions with which the PI(s), co-PI(s), and other senior personnel have financial ties, including advisory committees (specify type), boards of directors, or prospective employees. Provide this table as a text-searchable single Portable Document Format (PDF) file in FastLane in the single copy section of the full proposal.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Proposers should prepare annual budgets in accordance with the roles, requirements, and responsibilities outlined in Section II, "Program Description," Section III, "Award Information," and the budgetary limitations below.

All proposals

- The year one budget includes all start-up costs.
- Annual budgets should include travel for staff to participate in Governance meetings, REU site program, Summer Institute, one NSF-supported Large Facility Workshop, and one NSF-supported Cybersecurity Summit.
- Up to $10,000 should be budgeted annually to provide local staff support for the REU students at the project location.
- Up to $10,000 should be budgeted for local staff support to participate in the NHERI Summer Institute.
- Postdoctoral researchers may be supported only on the SimCenter award and must be U.S. citizens, U.S. nationals, or permanent residents of the United States.
- Graduate students who are U.S. citizens, U.S. nationals, or permanent residents of the United States may be supported in three ways: (a) to assist with local campus implementation of the REU site program, (b) as participants in the SimCenter Research Traineeship program, or (c) to support other Awardee activities, if approved in the annual work plan by the cognizant NSF Program Officer. Other graduate students may not be supported.
- Proposals may include participant support costs for specific activities identified in the proposal. Include a budget justification table showing the activity name, number of participants, and total participant support costs for each activity.

NCO, CI, and SimCenter proposals only

- The annual budget should not exceed the base budget for the "Anticipated Annual Support" for the proposed component listed in the Table in Section III. The annual budget should not include budget allocations for annual Council work plan activities.

NCO proposals only

- Annual budgets must include costs to implement the REU Site and Summer Institute programs, including participant support costs for all REU students and Summer Institute attendees.

EF proposals only

- The Table in Section III provides the total NSF base budget support anticipated to be available for up to six EF awards annually. Annual requested NSF budgets should not request a disproportionate amount of this total support. Based on the Facility Financial Resource Operating Plan and anticipated use, the facility total operations budget will be a combination of support provided through the NSF NHERI award, support provided through institutionally-established user fees/recharge rates charged to NSF-supported users for costs not covered by the NSF NHERI award, and support provided by non-NSF supported users who pay full recovery costs to utilize the facility through institutionally-established user fees/recharge rates. Annual requested NSF budgets should not include budget allocations for potential additional support for year one EF upgrades, annual Council work plan activities, and EF equipment repairs.
- Budget justification should include itemized, equipment-specific costs for annual maintenance and calibration.
- RAPID Facility only: The year-two budget should include an increase of up to $1,200,000 for resource procurement and commissioning.

Budget Preparation Instructions:

The **full proposal** must include a budget for each of the five years. FastLane and Grants.gov will automatically provide a cumulative budget.

Include separate budgets for subawards/subcontracts that are $50,000 or greater annually. For subawards/subcontracts less than $50,000 annually, include the costs aggregated on the subaward line of the annual budget. In the budget justification, provide a list of all organizations that will receive less than $50,000 annually and the annual support provided to each organization.

C. Due Dates

- **Letter of Intent Due Date(s) *(required)*** (due by 5 p.m. proposer's local time)***:***

  November 06, 2014

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

  December 03, 2014

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane 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: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons

they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://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 *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG 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 GPG 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 underrepresented minorities 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

Reviewers will be asked to evaluate the **strengths and weaknesses** of the proposal in response to the requirements and responsibilities described in Section II as follows:

A. All Proposals (NCO, CI, SimCenter, and EF, including RAPID Facility, Proposals)

1. How the Science Plan conveys a compelling scientific vision, grand research challenges, and key research questions at the cusp of emerging discoveries in earthquake engineering, wind engineering, and/or multi-hazard engineering.
2. How the proposed project provides unique and essential resources, services, and activities that will enable the natural hazards engineering community to address the grand research challenges and key research questions.

B. Network Coordination Office (NCO) Proposals Only

1. Quality of the proposed project in responding to the requirements and responsibilities in Section II.C, All Awardees (NCO, CI, SimCenter, and EF) - Common Awardee Requirements and Responsibilities.
2. Quality of the proposed project in responding to the requirements and responsibilities in Section II.D, Network Coordination Office (NCO) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones.

C. Cyberinfrastructure (CI) Proposals Only

1. Quality of the proposed project in responding to the requirements and responsibilities in Section II.C, All Awardees (NCO, CI, SimCenter, and EF) - Common Awardee Requirements and Responsibilities.
2. Quality of the proposed project in responding to the requirements and responsibilities in Section II.E, Cyberinfrastructure (CI) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones.

D. Computational Modeling and Simulation Center (SimCenter) Proposals Only

1. Quality of the proposed project in responding to the requirements and responsibilities in Section II.C, All Awardees (NCO, CI, SimCenter, and EF) - Common Awardee Requirements and Responsibilities.
2. Quality of the proposed project in responding to the requirements and responsibilities in Section II.F, Computational Modeling and Simulation (SimCenter) Component - Additional Awardee Requirements, Responsibilities, and Key Year One Milestones.

E. Experimental Facility (EF), including RAPID Facility, Proposals Only

1. Quality of the proposed project in responding to the requirements and responsibilities in Section II.C, All Awardees (NCO, CI, SimCenter, and EF) - Common Awardee Requirements and Responsibilities.
2. Quality of the proposed project in responding to the requirements and responsibilities in Section II.G, Experimental Facility Component, including the RAPID Facility - Additional Awardee Requirements, Responsibilities, and Key Milestones.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, Internal NSF Review, Site Visit Review, or Reverse Site Review.

Proposals will be reviewed in accordance with standard NSF external merit review policy, which may consist of a combination of panel and ad hoc mail review. Selected proposals may be further reviewed by a reverse site visit at NSF and/or a campus site visit to the lead institution. Dates for site visits will be communicated by the Lead Cognizant Program Officer to selected PIs as early in the review process as practicable. These dates will be non-negotiable, and it is expected that the PI, co-PIs, and leadership and management team will be available on the scheduled date. It is the responsibility of the PI to assure that contact information for the scheduling of these meetings is correct. Travel and other costs incurred by proposers for this review process will be the responsibility of the proposers. All PIs will receive documentation regarding the review process, including reviews and panel summaries, upon completion of the process.

Upon completion of the NSF merit review process, proposals to be recommended for an award will undergo a management and budget justification review by NSF staff to assess the lead institution's capability to execute the award and the appropriateness of the budget request. Proposers must be available to provide additional business or budgetary information to support the award recommendation. This review may be done by either a visit from NSF staff to the lead institution or by video teleconference.

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 be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on

the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, 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.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications and 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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Acquisition and Cooperative Support. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process).

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

The cooperative agreement will be administered by the Division of Civil, Mechanical and Manufacturing Innovation in the Directorate for Engineering and the Division of Acquisition and Cooperative Support in the Office of Budget, Finance, and Award Management.

NSF oversight of the cooperative agreement will include the following:

Award-Specific Programmatic Terms and Conditions, for all Awardees, unless otherwise indicated:

- Review and/or approval of the following:
  - Review and approval of Annual and Final Progress Reports.
  - Review of Quarterly Interim Reports.
  - Review and approval of changes in Key Personnel (leadership and management) positions. Approval from NSF is required before a change is implemented.
  - Review and approval of the Strategic Plan for Operations, including Performance Metrics.
  - Review and approval of Annual Work Plans.
  - Review and approval of all plans for Conferences, Symposia, and Workshops included as part of the Annual Work Plan; these plans must be prepared in accordance with NSF Grant Proposal Guide requirements for Conferences, Symposia and Workshops in effect at the time of plan preparation and must be approved by NSF prior to implementation.
  - Review and approval of the Risk Management System.
  - Review and approval of the documents completed at the end of year one for the RAPID Facility.
  - Review and approval of requests to support graduate students who are U.S. citizens, U.S. nationals, or permanent residents of the Unites States to participate in awardee activities other than the NHERI-wide REU site activity and SimCenter Graduate Research Traineeships.
  - Review and, if required, approval of notifications of incidents related to cybersecurity.
  - Review and, if required, approval of notifications to NSF by EF Awardee about incidents related to EH&S requirements and equipment damage/failure.
  - Awardee-proposed national and international partnerships that require the Awardee's signature on a Memorandum of Understanding or similar documents.
- Site visit merit reviews, to justified continued funding; cross-Awardee merit reviews may be held jointly to evaluate and assess the extent of cross-Awardee coordination:
  - NCO, CI, and SimCenter Awardees: Annual site visits, organized by NSF, with external reviewers, with location to be either at NSF or the lead institution.
  - EF Awardees (including the RAPID Facility): Site visits, organized by NSF, with external reviewers, with the location to be either at NSF or the facility location. NSF plans to site visit three EF Awardees annually at the facility

location.
    - RAPID Facility Awardee: Year one site visit at the facility location, organized by NSF, with external reviewers.
- NSF Business Systems Review, typically scheduled once during the five-year award period, with the review to be conducted within the first two years of the award date.
- EF Awardees: submission to NSF of annual institutional laboratory inspection reports, with a summary of the corrective actions taken.

Award-Specific Financial/Administrative Terms and Conditions, for all Awardees, unless otherwise indicated:

Budgetary Requirements

- National laboratories and private sector companies, as well as non-U.S. institutions, may participate in award activities using their own resources and cannot receive NSF support from an award made under this solicitation; however, this shall not be interpreted to prohibit purchases, services, or sales contracts/agreements with these entities.
- Review and/or approval of the following:
    - Rebudgeting of $50,000 or greater by the Awardee or a subaward.
    - Use of unobligated carryover funds from the prior budget year not intended to be applied to support the next year's annual budget.
    - EF Awardees: In the case of major equipment damage, NSF support to restore functionality would be contingent upon the cause of damage, prior equipment utilization history, remaining useful life of the equipment if repaired, future planned use of the equipment by NSF-supported projects, total cost of repair or replacement, quality of maintenance based on historical records, date and nature of original acquisition of the equipment, appropriateness of NSF support, and annual NSF budgets.
- EF Awardees: Program income must be certified by the Awardee Authorized Organizational Representative and reported annually. NSF may require the use of program income to offset the NSF support.

- NSF support will not be provided to repair/replace equipment that was damaged or not operational for its intended use prior to the effective start date of the award.

Standard Cooperative Agreement Terms and Conditions, including supplements for managers of Large Facilities, are available at http://www.nsf.gov/awards/managing/co-op_conditions.jsp?org=NSF. These terms and conditions will apply to all NHERI Awardees.

Programmatic and financial/administrative terms and conditions not listed above will be negotiated at the time of award.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

The Awardee must submit a comprehensive annual progress report to NSF containing a summary of the progress during the current year against the performance metrics and work plan and the work plan and budget for the next year funding increment. Quarterly interim reports will be submitted to track progress during the current year.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Joy M. Pauschke, Program Director, Division of Civil, Mechanical and Manufacturing Innovation (Lead Cognizant Program Officer), telephone: (703) 292-7024, email: jpauschk@nsf.gov

- Anna-Lee Misiano, Grants and Agreements Specialist, Division of Acquisition and Cooperative Support, telephone: (703) 292-4339, email: amisiano@nsf.gov

- Kevin Thompson, Program Director, Division of Advanced Cyberinfrastructure, telephone: (703) 292-4220, email: kthompso@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation

message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

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 http://www.grants.gov.

References:

1. National Earthquake Hazards Reduction Program (NEHRP), *Strategic Plan for the National Earthquake Hazards Reduction Program, Fiscal Years 2009-2013*, October 2008, http://www.nehrp.gov/pdf/strategic_plan_2008.pdf.
2. National Research Council, *National Earthquake Resilience: Research, Implementation, and Outreach*. Washington, DC: The National Academies Press, 2011, http://www.nap.edu/catalog.php?record_id=13092.
3. National Research Council, *Grand Challenges in Earthquake Engineering Research: A Community Workshop Report*. Washington, DC: The National Academies Press, 2011, http://books.nap.edu/catalog.php?record_id=13167.
4. National Science and Technology Council, *Windstorm Impact Reduction Implementation Plan*, http://www.whitehouse.gov/sites/default/files/microsites/ostp/windstorm_impact_reduction_implementation_plan_final.pdf.
5. National Science Board, Hurricane Warning-The Critical Need for a National Hurricane Research Initiative, 2007, http://www.nsf.gov/nsb/publications/landing/nsb06115.jsp?org=NSF.
6. NIST GCR 14-973-13, *Measurement Science R&D Roadmap for Windstorm and Coastal Inundation Impact Reduction*. (This roadmap developmental effort was supported in part by NSF, through award CMMI-1235689, to obtain community input on related long-term fundamental research challenges in windstorm and coastal inundation impact reduction), http://www.nist.gov/customcf/get_pdf.cfm?pub_id=915541.
7. National Science Foundation, *Investing in Science. Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*, http://www.nsf.gov/about/performance/strategic_plan.jsp.
8. National Science Foundation, *Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)*, http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504730.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 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.

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• **To Locate NSF Employees:**	(703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). 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
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

X. APPENDIX

A. Full Proposal Compliance Checklist

1. Compliance with NSF Grant Proposal Guide

Upon receipt of proposals, the Division of Civil, Mechanical and Manufacturing Innovation (CMMI) administratively reviews proposals for compliance with the version of NSF Grant Proposal Guide (GPG) in effect on the full proposal submission deadline date. A full proposal submitted to this solicitation that is not compliant with the GPG, except where this solicitation included additional eligibility limitations in Section IV and required deviations in proposal preparation and submission instructions in Section V, will be returned without review.

2. Compliance with this Solicitation

A full proposal submitted to this solicitation must be compliant with the requirements in Section II. Program Description; Section IV, Eligibility Information; and Section V.A, Proposal Preparation. Proposals not compliant with these sections will be returned without review. Proposers should use the checklist below to review their proposal for compliance prior to submission. The section listed in parenthesis is the section in the solicitation for compliance.

1. Proposal is submitted by an organization that is not a University or College that is accredited in, and having a campus located in, the US acting on behalf of its faculty members (Section IV).
2. Proposal is submitted as collaborative full proposals with multiple administrative packages (Section IV).
3. Experimental Facility (EF) or RAPID Facility proposal is not a single academic institution proposal (Section IV).
4. Experimental Facility (EF) or RAPID Facility proposal does not have all proposed facility resources owned, operated, and maintained by the academic institution and located within the United States to facilitate access by NSF-supported users (Section IV).
5. An academic institution submits more than two proposals to this solicitation (Section IV).
6. An academic institution submits more than one proposal to any of the following proposal categories: Network Coordination Office, Cyberinfrastructure, Computational Modeling and Simulation, and Experimental Facilities (Section IV).
7. Principal Investigator (PI) or co-PI appears in more than one proposal submitted in response to the full proposal deadline (Section IV).
8. Proposal is submitted by an academic institution that has not submitted a Letter of Intent (LOI) by the Letter of Intent Due Date (Section V.A).
9. Proposal requests support for the following (Section II.G):
    - Fire testing equipment and capabilities;
    - Experimental capabilities that do not support earthquake engineering or wind engineering research;
    - With the exception of the RAPID Facility, the establishment of a new laboratory, acquisition of new/replacement major experimental equipment, major equipment refurbishments and upgrades,

capital improvements to existing laboratory buildings and space, and construction of new buildings;
    - A distributed facility, with resources owned, housed, and/or maintained by multiple organizations;
    - A facility with any equipment that can only be accessed or used outside the United States;
    - A facility with the primary focus and capability for development of advanced experimental testing algorithms and techniques; or
    - A facility for long-term instrumented structures and/or field sites.
10. Project Description, exclusive of Section 1, Tables 1-3, exceeds 45 pages (Section V.A).
11. Project Description does not use the order, section numbering, and headings required (Section V.A).
12. Proposal includes names of committee members, chairs, and organizational affiliations (Section V.A).
13. Proposal includes introductory material preceding the Project Description, Section 1 (Section V.A).
14. Proposal includes participating organizational names within the proposal but does not list these organizations in the Project Description, Section 1, Table 1 (Section V.A).
15. Proposals does not identify names of individuals for all leadership and management positions in the Project Description, Section 1, Table 2 (Section V.A).
16. Proposal includes names of individuals to be supported anywhere in the proposal but does not list these names in the Project Description, Section 1, Table 2 (Section V.A).
17. Proposal includes other project personnel names anywhere in the proposal and does not list these names in Table 3 (Section V.A).
18. Proposal includes letter(s) of collaboration that do not conform to the solicitation template (Section V.A).
19. Proposal includes letter(s) of collaboration from an individual designated as a Principal Investigator (PI), co-PI or senior personnel or from an organization that requests financial support (Section V.A).
20. Proposal contain quantifiable budgetary information in the Facilities, Equipment and Other Resources section (Section V.A).
21. Proposal does not include the information required in the Special Information and Supplementary Documentation section (Section V.A).

B. Frequently Asked Questions (FAQs)

1. Question: Will all awards be made at the same time?

   Answer: The Cyberinfrastructure (CI) award will be made first, followed by the Network Coordination Office (NCO). Timing of the remaining awards will be contingent upon the outcomes of merit review process and NSF's management and budget review.

2. Question: Can each Awardee maintain its own website?

   Answer: No. NSF will only support the NHERI website operated by the Cyberinfrastructure (CI) Awardee.

3. Question: Can an academic institution submit Cyberinfrastructure (CI) and Computational Modeling and Simulation (SimCenter) proposals?

   Answer: Yes.

4. Question: Can an academic institution submit an Experimental Facility (earthquake or wind engineering facility) proposal and a RAPID Facility proposal?

   Answer: No. Section IV, Eligibility Information, lists the RAPID Facility as part of the Experimental Facility category and proposers may not submit more than one proposal as the lead institution to any one of the four categories listed.

5. Question: Does NSF have a target number of earthquake engineering Experimental Facilities (EF) and wind engineering EF it plans to support?

   Answer: There is no target number. The number of earthquake engineering EF and the number of wind engineering EF to be supported will be contingent upon the quality of proposals and the annual budgets of NSF.

6. Question: Why does an Experimental Facility (EF) have to delegate its resource scheduling to the Network Coordination Office rather than directly scheduling its own users?

   Answer: One of NHERI's operational goals is open and equal access to NHERI resources. Using a third party, i.e., the Network Coordination Office (NCO), to be responsible for scheduling will facilitate open and equal access with transparency to the user community.

7. Question: Can a proposed Experimental Facility (EF) include both earthquake and wind engineering experimental equipment?

   Answer: Yes, but the combined equipment will be considered one EF, as each institution can propose only one EF.;

8. Question: Is each Awardee expected to participate in both the REU site and Summer Institute programs?

   Answer: Yes.

9. Question: Why is a facility for long-term instrumented structures and/or field sites not eligible?

Answer: For earthquake engineering, this activity is part of the U.S. Geological Survey's Advanced National Seismic System (ANSS). For both earthquake engineering and wind engineering needs, this long-term monitoring activity is better suited for support through relevant mission Federal agencies.

C. Background - NEES Construction, Operations, and Research during FY 2000 - 2014

NEES was the result of over a decade of planning by the earthquake engineering community. NEES was approved for construction by the NSB in November 1998. NSF supported NEES construction during FY 2000 - 2004 and was NSF's flagship investment in major geographically distributed, cyber-enabled, networked research facilities. NSF began support for NEES operations and research on October 1, 2004. NSF support for operations and research ends on September 30, 2014.

NEES operations has been managed under five-year cooperative agreement with Purdue University (incumbent). The NEES research infrastructure supported by the incumbent is described at http://www.nees.org. The incumbent's current operated experimental infrastructure consists of 14 facilities, which include shake tables, geotechnical centrifuges, a tsunami wave basin, unique large-scale testing laboratory facilities, and field testing equipment. The NEEShub cyberinfrastructure connects, via Internet2,

the experimental facilities as well as provides telepresence; a curated data repository known as the Project Warehouse (http://nees.org/warehouse/welcome); computational, simulation, and visualization tools; collaborative tools for facilitating on-line planning, execution, and post-processing of experiments; hybrid and multi-site hybrid simulation tools; access to high performance computing; information and user manuals about NEES resources; facility policies and procedures; and the NEES Academy for education, outreach, and training. The NEEShub, with the exception of the Project Warehouse, is built upon Purdue University's HUBzero® technology. NSF supports research to use NEES through separate awards made primarily through an annual NSF program solicitation for NEES research. Through NSF support, the incumbent will continue to operate only the NEEShub cyberinfrastructure through May 31, 2015, to provide continued operations for the research community and to assist the NHERI CI Awardee with the cyberinfrastructure transition.

NEES is currently a science gateway under the Extreme Science and Engineering Discovery Environment (XSEDE) https://www.xsede.org/gateways-listing. Additionally, since 2005, NEES has leveraged and complemented its capabilities through partnership agreements with large-scale testing facilities at foreign earthquake-related centers, laboratories, and institutions. The Japanese National Research Institute for Earth Science and Disaster Prevention's (NIED) 3-D Full-Scale Earthquake Testing Facility (E-Defense) in Miki, Japan, the world's largest shake table, became operational in 2005. To facilitate NEES/E-Defense collaboration, in September 2005, NSF and the Japanese Ministry of Education, Culture, Sports, Science, and Technology signed a memorandum concerning cooperation in the area of disaster prevention research. To facilitate joint use of experimental facilities and cyberinfrastructure, Purdue University has signed cooperative partnerships with NIED, Canadian Seismic Research Network, Port and Airport Research Institute (Yokosuka, Japan) and Tongji University, Shanghai, People's Republic of China. These partnerships will expire on September 30, 2014.