Future Internet Architectures -- Next Phase (FIA-NP)

PROGRAM SOLICITATION
NSF 13-538

REPLACES DOCUMENT(S):
NSF 10-528

National Science Foundation

Directorate for Computer & Information Science & Engineering
 Division of Computer and Network Systems

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

June 07, 2013

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* **(PAPPG), NSF 13-1 , was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1 .**

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions . While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide* .

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide .

Revision Summary

This is a revision of NSF 10-528 , the Future Internet Architecture solicitation. The revisions include: (1) the requirement for the project manager (as defined in the " *Collaboration and Management Plan* " section) on a proposal in response to this solicitation be a PI, co-PI, or senior personnel on one of the four currently-funded FIA projects; (2) the limitation that an individual who is not a project manager on a FIA-NP project may serve as PI, co-PI, or senior personnel on no more than 2 proposals; (3) a change in the expected project duration and budget; (4) new 25-page limit for Project Description, (5) modifications and additions to the Project Description sections; (6) new 3-page limit for the collaboration and management plan; (7) new additional solicitation-specific review criteria; (8) a requirement for software developed as part of this program to be released under an open source license listed by the Open Source Initiative; and (9) a clarification about when letters of support are appropriate or not.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Future Internet Architectures -- Next Phase (FIA-NP)

Synopsis of Program:

Continuing its long-standing commitment of supporting groundbreaking research in large-scale networking systems, the Directorate for Computer and Information Science and Engineering (CISE) invites research teams to submit innovative and creative proposals that leverage and enhance existing Future Internet Architecture (FIA) designs and seek to create and demonstrate prototype systems that will be tested and evaluated in one or more relevant environments. Proposing teams should include individuals with expertise in a range of relevant disciplines and/or research areas, from the theoretical to experimental to those working in application domains, in order to address the requirements of a FIA and successfully satisfy the goals of a functioning prototype FIA.

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.

- Darleen L. Fisher, Program Director, telephone: (703) 292-8950, email: dlfisher@nsf.gov
- J. Bryan Lyles, Program Director, telephone: (703) 292 8950, email: jlyles@nsf.gov

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

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 2 to 4

Anticipated Funding Amount: $10,000,000 to $20,000,000 dependent upon the availability of funds and the quality of proposals received. CISE expects to support 2-4 projects, each with cumulative budgets of up to $5 million and durations of 2 years.

Eligibility Information

Organization Limit:

> The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

> The project manager (as defined in the "*Collaboration and Management Plan*" section) on a proposal submitted in response to this solicitation must be a PI, Co-PI, or senior personnel on one of the four currently-funded FIA projects.

Limit on Number of Proposals per Organization:

> None Specified

Limit on Number of Proposals per PI:

> An individual who is identified in the "*Collaboration and Management Plan*" section of a proposal as the project manager may be affiliated with **only that** project and cannot serve as PI, co-PI, or senior personnel on any other FIA-NP proposal. There is a limit of two FIA-NP proposals on which an individual who is not a project manager on a FIA-NP project can serve as a PI, co-PI, or senior personnel.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **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:** Not Applicable

C. Due Dates

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

  > June 07, 2013

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: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Future Internet Architecture (FIA) program was conceived in 2007 to design, explore, and show proof of concept at scale of computer networking architectures that could meet the needs of the 21 st century as well as educate a cadre of large-scale network architects. The program was envisioned as being comprised of three phases. The first phase was part of the Networking Technology and Systems (NeTS) program within the Division of Computer and Network Systems (CNS), which solicited Future Internet Design (FIND) projects and awarded proposals that pursued innovative network architectural components that were not constrained by the current Internet. In 2010, a FIA solicitation through the cross-directorate Network Science and Engineering (NetSE) program funded projects that sought to design and develop integrated trustworthy architectures that had similar scope to the current Internet, but were not constrained by the Internet's existing design or deployment. This solicitation is for the third phase, termed FIA Next Phase (FIA-NP), of CISE's commitment to fostering innovative, large-scale, trustworthy computer network architectures. FIA-NP seeks to move currently funded FIA projects from design with integrated working code to proof of concept at reasonable scale within challenging and realistic environments.

II. PROGRAM DESCRIPTION

Over the past 7 years, the Directorate for Computer and Information Science and Engineering (CISE) has invested in fundamental research that will lead to trustworthy computer network architectures that will meet the needs of the twenty-first century. CISE is issuing this solicitation to support research that builds upon its current investments in Future Internet Architectures (FIA). Proposals are expected to specify research activities that will take existing FIA designs from basic components that have been integrated into early prototypes that demonstrate architectural principles and requirements to more sophisticated architectures with demonstrated prototype systems. The architectures will be tested and evaluated via the prototypes in one or more relevant environments. The proposed projects should continue to take into consideration the larger societal, economic and legal issues that arise from the interplay between the Internet and society.

The research team conducting the work articulated in the proposal should include individuals with expertise in a range of relevant disciplines and/or in using different research methods and must include at least one expert in network security. A project should include subject area experts in the environments in which the architecture will be tested. The project team is also encouraged to include experts in social, economic and legal issues such as, but not limited to, experts in values in design. The team should include researchers with the range of necessary expertise, but no more than appropriate for the completion of the project.

III. AWARD INFORMATION

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 2 to 4

Anticipated Funding Amount: $10,000,000 to $20,000,000 dependent upon the availability of funds and the quality of proposals received. CISE expects to support 2-4 projects, each with cumulative budgets of up to $5 million and durations of 2 years.

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

IV. ELIGIBILITY INFORMATION

Organization Limit:

> The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

> The project manager (as defined in the " *Collaboration and Management Plan* " section) on a proposal submitted in response to this solicitation must be a PI, Co-PI, or senior personnel on one of the four currently-funded FIA projects.

Limit on Number of Proposals per Organization:

> None Specified

Limit on Number of Proposals per PI:

> An individual who is identified in the " *Collaboration and Management Plan* " section of a proposal as the project manager may be affiliated with **only that** project and cannot serve as PI, co-PI, or senior personnel on any other FIA-NP proposal. There is a limit of two FIA-NP proposals on which an individual who is not a project manager on a FIA-NP project can serve as a PI, co-PI, or senior personnel.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

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.

In addition to the guidelines in the GPG or NSF Grants.gov Application Guide, proposal preparation instructions specific to the preparation of proposals submitted in response to this solicitation are provided below:

- **Cover Sheet.** For management purposes, all proposal titles should begin with the FIA-NP acronym. For proposals coming from a single institution, the FIA-NP acronym should be directly followed by the project title (i.e., **FIA-NP: Project Title**). If the proposal is part of a set of collaborative proposals, the FIA acronym should be followed by a colon, then by the words "Collaborative Research" followed by a colon, and then the title (i.e., **FIA-NP: Collaborative Research: Title).**

- **Project Summary.** The proposal must contain a summary of the proposed activity suitable for publication. The summary must not exceed one page and should be informative to other persons working in the same or related fields.

- **Project Description.** The Project Description is limited to 25 pages, and must include the following topics:
    - *Vision*: describe a well-articulated "vision" of the proposed comprehensive architecture, its high-level objectives, and its motivating ideas.
    - *Architecture*: describe the underlying architecture design and summarize what has already been developed at the time of the proposal submission, including how the design requirements (such as trustworthiness), invariants and components are synthesized into a coherent comprehensive architecture. This section should also include the current status of developed prototypes.
    - *Research Agenda*: define a coherent research agenda focused on principled design by describing how the proposed work will extend and evaluate the proposed architecture and will result in a stable prototype of a complete system applied to one or more realistic network environments; include a description of future security/trustworthiness research as well as research in considering the relevant larger social, economic and/or legal challenges facing the architecture.
    - *Network Environments:* include and describe at least one and preferably two relevant and realistic environments that will be used to inform, test and demonstrate the overall architecture's feasibility and value of the architecture in realistic settings. Examples of environments might include: an enterprise with special network requirements; a critical infrastructure; a content delivery network with embedded clouds; a civil crisis or public safety network; a complex network of things; interconnected cyber-physical systems; or the public Internet (i.e., the architecture is designed to run in parallel with, or instead of, the current Internet).
    - *Evaluation Plan:* include an evaluation plan that specifies criteria or metrics relevant to the scientific and engineering goals of the project, and that gives a description of how the evaluation will be conducted. The evaluation plan should include an assessment of trustworthiness and an analysis of how well the architecture performs against the relevant criteria or metrics. The evaluation may require the construction of new artifacts or the use of research infrastructures like GENI (Global Environment for Network Innovations) or other test and evaluation facilities.
    - *Education and Outreach*: describe plans to integrate education and research focused on exploring architectural design and understanding of large-scale systems. Discuss plans to stimulate interest in architectures and networked systems in undergraduate and graduate education and/or to foster innovation by students using prototype platforms on campus, and describe one or more outreach activities.

    Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. You can decide where to include this section within the project description.

- **Budget**: Provide a detailed budget for each year of the project. FastLane or Grants.gov will automatically generate a cumulative budget. The budget should include funds for domestic travel for 3 two-day awardee meetings per year for the PIs and co-PIs. Each collaborative proposal or subcontract must submit a separate budget and budget justification (two-page limit for each collaborative proposal). Identify items of equipment costing more than $10,000; full justification of the latter is required.

- **Lead Institution Required Supplementary Documents:** In the Supplementary Documents Section, the lead institution should upload the following information (not part of the project description and need only be submitted by the lead institution):

    - *Collaboration and Management Plan:* in a supplemental document (up to 3 pages), describe a comprehensive collaboration and management plan: identify the project manager who will take responsibility for overall project coordination and management and will serve as the contact PI for the project; describe management and research responsibilities for the project; define the expected contributions of each of the PIs and provide a convincing case that the collaborative contributions of the project team members will be greater than the sum of each of their individual contributions; describe mechanisms for integrating and managing all organizations and individuals involved in the project to ensure the project goals are met; provide a timeline for the proposed effort and identify the parties responsible for each major task. The management plan must include a process for how changes will be made to the management team or to key personnel should that become necessary during the course of the project. The length of and degree of detail provided in the Collaboration and Management Plan should be commensurate with the complexity of the proposed project.

    - *Intellectual property* (up to 1 page): in a supplemental document, provide a clear statement of the project's policies on intellectual property. Discuss the nature of the research, methodologies used, ownership and ideas, and roles and responsibilities with respect to intellectual property for each institution. Any software developed as part of this program is required to be released under an open source license listed by the Open Source Initiative (http://www.opensource.org/).

    - *Personnel*: a list of PIs, co-PIs, senior personnel, collaborators, paid consultants, and post-doctoral researchers who will be involved in the project. This list should be numbered and include (in this order) full name, organization(s), and role in the project, with each item separated by a semi-colon. Each person listed should start on a new numbered line. For example:
        1. Mary Smith; XYZ University; PI
        2. John Jones; University of PQR; Senior Personnel
        3. Jane Brown; XYZ University; Postdoc
        4. Bob Adams; ABC Inc.; Paid Consultant

        The personnel information provides NSF and reviewers with a comprehensive list of personnel and institutions involved in the project, and will be used when determining conflicts of interest in the review process.

- Letters of commitment should be included only if they document collaboration or contributions of resources, data, or other assistance necessary to carry out this project.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

C. Due Dates

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

    June 07, 2013

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

    Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are 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.

    Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **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://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding 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.

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://www.nsf.gov/bfa/dias/policy/meritreview/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016* . 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 core strategies 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 provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening 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

In addition to the merit review principles and criteria described above, FIA-NP proposals will also be evaluated by the extent to which the:

- Current Future Internet Architecture that forms the basis for the proposed work includes basic components, which are implemented in code or hardware, and which work together to demonstrate a prototype of a comprehensive internet architecture.
- Proposed Future Internet Architecture has a solid security design supported by prototype implementation.
- Research agenda and an associated coordination and management plan provide confidence that the project will advance the architecture and implementation to a system prototype demonstration in one or more relevant environments.
- Targeted environments are realistic and are sufficiently important or critical so that the architecture tested and evaluated on them will show promise for a future viable deployment at a large scale.
- Evaluation plans and the metrics described in the proposal are well developed and appropriate to determine systematically the value and significance of the Future Internet Architecture at least within the chosen environment(s).
- Architecture takes into consideration the relevant larger societal, economic and/or legal issues that arise from the interplay between the Future Internet Architecture and society.

B. Review and Selection Process

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

Reverse Site Visits will be used as needed.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. 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 Grants and Agreements 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 Grants and Agreements. 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 letter, 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 letter; (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 letter. 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.

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.

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:

- Darleen L. Fisher, Program Director, telephone: (703) 292-8950, email: dlfisher@nsf.gov

- J. Bryan Lyles, Program Director, telephone: (703) 292 8950, email: jlyles@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, National Science Foundation Update is a free e-mail subscription service 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 Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

Related Programs:

- Computer and Network Systems (CNS): Core Programs

- Networking Technology and Systems (NeTS)

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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.

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- **Location:**   4201 Wilson Blvd. Arlington, VA 22230

- **For General Information**   (703) 292-5111
  (NSF Information Center) **:**

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