Virtual Organizations as Sociotechnical Systems (VOSS)

Program Solicitation

NSF 08-550

National Science Foundation

Office of Cyberinfrastructure

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

June 02, 2008

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Virtual Organizations as Sociotechnical Systems (VOSS)

Synopsis of Program:

A virtual organization is a group of individuals whose members and resources may be dispersed geographically, but who function as a coherent unit through the use of cyberinfrastructure. Virtual organizations are increasingly central to the science and engineering projects funded by the National Science Foundation. Focused investments in sociotechnical analyses of virtual organizations are necessary to harness their full potential and the promise they offer for discovery and learning.

The Virtual Organizations as Sociotechnical Systems (VOSS) program supports scientific research directed at advancing the understanding of what constitutes effective virtual organizations and under what conditions virtual organizations can enable and enhance scientific, engineering, and education production and innovation. Levels of analysis may include (but are not limited to) individuals, groups, organizations, and institutional arrangements. Disciplinary perspectives may include (but are not limited to) anthropology, complexity sciences, computer and information sciences, decision and management sciences, economics, engineering, organization theory, organizational behavior, social and industrial psychology, public administration, and sociology. Research methods may span a broad variety of qualitative and quantitative methods, including (but not limited to): ethnographies, surveys, simulation studies, experiments, comparative case studies, and network analyses.

VOSS funded research must be grounded in theory and rooted in empirical methods. It must produce broadly applicable and transferable results that augment knowledge and practice of virtual organizations as a modality. VOSS does not support proposals that aim to implement or evaluate individual virtual organizations.

Cognizant Program Officer(s):

- Diana Rhoten, Lead Program Director, OD/OCI, NSF, 1145S, telephone: 703-292-8276, fax: 703-292-8976, email: drhoten@nsf.gov
- Wayne Lutters, Program Director, CISE/IIS, NSF, 1125, telephone: 703-292-8930, email: wlutters@nsf.gov

- Mary Lou Maher, Program Director, CISE/IIS, NSF, telephone: (703) 292-8930, email: mmaher@nsf.gov
- Julia I. Lane, Program Director, SBE/SciSIP, NSF, telephone: (703) 292-5145, email: jlane@nsf.gov
- Jacqueline Meszaros, Program Director, SBE/SES, NSF, telephone: 703-292-7261, email: jmeszaro@nsf.gov
- Stephen Nash, Program Director, ENG/EFRI, NSF, telephone: 703-892-7902, email: snash@nsf.gov
- Phillip R. Westmoreland, Program Director, ENG/CBET, NSF, 565, telephone: 703-292-8695, email: pwestmor@nsf.gov
- Arlene DeStrulle, Program Director, EHR/DRL, NSF, telephone: 703-292-5117, email: adestrul@nsf.gov
- Barbara Olds, Senior Advisor, EHR, NSF, telephone: 703-292-5304, email: bolds@nsf.gov

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

- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 10 to 15 new awards

Anticipated Funding Amount: $3,000,000 pending the availability of funds and quality of proposals. Award sizes are expected to range from $50,000 to $400,000 in total costs (including indirect costs) for the period of the grant with durations up to three years.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Universities and Colleges: Universities and two- and four-year colleges (including community colleges) located and accredited in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An investigator may participate as a PI, co-PI, or other senior personnel in no more than two proposals submitted in FY 2008 in response to this program solicitation. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any non-lead collaborative proposal. This restriction applies to this solicitation only and is not meant to inhibit submissions of proposals by investigators to other NSF activities or programs.

For the purposes of this VOSS solicitation, senior personnel include the PI, any co-PIs, and any other researchers actively involved in the scientific or technical management of the project, including sub-awardees. It does not include students, postdoctoral researchers, or consultants who provide specific expertise on a limited portion of the project

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/bfa/dias/policy/docs/grantsgovguide.pdf)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **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 02, 2008

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.

TABLE OF CONTENTS

I. INTRODUCTION

The Virtual Organizations as Sociotechnical Systems (VOSS) program supports scientific research directed at advancing the understanding of what constitutes effective virtual organizations and under what conditions virtual organizations can enable and enhance scientific, engineering, and education production and innovation. VOSS funded research must be grounded in theory and rooted in empirical methods. It must produce broadly applicable and transferable results that augment knowledge and practice of virtual organizations as a modality. VOSS supported projects that use functioning organizations as data sources are encouraged, but should be designed such that the findings extend beyond that unit and sample. **VOSS does not support proposals that aim to implement or evaluate individual virtual organizations.**

Projects that develop or build on research perspectives that cross disciplinary lines are strongly encouraged. VOSS research might draw on theories and findings from anthropology, complexity sciences, computer and information sciences, decision and management sciences, economics, engineering, organization theory, organizational behavior, social and industrial psychology, public administration, and sociology. Research methods may span a broad variety of qualitative and quantitative methods, including (but not limited to): ethnographies, surveys, simulation studies, experiments, comparative case studies, and network analyses.

There is a large corpus of research on the anthropology, sociology, psychology, and economics of collaborative groups, teams and organizations, as well as on technologically mediated work in social informatics, human-computer interaction, computer-supported cooperative work, computer-mediated communication, social computing, and new media. Although decades of this research have begun to yield best practices for collaborative and distributed work, the complex social and technical processes required for successful virtual organizations as applied to science and engineering have yet to be fully elucidated. The VOSS solicitation directly supports projects aimed at effectively promoting and leveraging the extension and integration of these lines of work to improve our understanding of the sociotechnical conditions under which new forms of virtual organizations are effective in science, engineering, and learning.

II. PROGRAM DESCRIPTION

There has been a growing shift away from traditions of individual based science toward more collaborative models. The intellectual challenges and institutional conditions of 21st century science and engineering necessitate collaboration. In many fields, scholars are confronted with challenges of a scale and complexity that defy the boundaries of traditional fields as well as the limits of individual capacity, thus requiring more diversified and at the same time unified participation from researchers. Many scientists and engineers find themselves today working in collaborations, many of which cross disciplinary, institutional, and geographic borders via the support of cyberinfrastructure.

Computer networking was first developed as a communication tool for scientists and engineers; and, e-mail and file transfers have long since supported distributed networks of scientific communication. However, more recent capabilities in high

performance computing, remote instrumentation, federated databases, and advanced simulation and visualization environments are allowing these intellectually diverse, geographically dispersed, and electronically connected networks of researchers to collaborate around data, workflows, and resources across time and space in unprecedented ways. Indeed, while technology may allow the formation of these end-to-end collaborations, it is the common purpose and/or shared goals of the participating scientists and engineers that transform them from loosely-coupled technostructures into more coherent sociotechnical systems—*aka* virtual organizations.

A virtual organization is a group of individuals whose members and resources may be dispersed geographically, yet who function as a coherent unit through the use of cyberinfrastructure. Virtual organizations may be known by a range of names, including: collaboratories, distributed work groups, virtual teams, online communities, and science gateways. Common characteristics across different types and classes of virtual organizations include:

- *Distributed across space*, with participants spanning localities and institutions;
- *Distributed across time*, allowing synchronous as well asynchronous interactions;
- *Dynamic structures and processes*, at every stage of the organizational lifecycle;
- *Computationally enabled*, via collaboration support systems including e-mail, teleconferencing, telepresence, awareness, social computing, and group information management tools; and,
- *Computationally enhanced*, with simulations, databases, instrumentation, analytic tools and services which facilitate interaction with human affiliates that are integral to the functioning of the organization.

Virtual organizations are often positioned in terms of their potential to advance national priorities of scientific innovation, educational development, and economic competitiveness. The proposition being that virtual organizations can more efficiently and effectively leverage the combination of diverse information and knowledge, skills and resources from different locations and thereby enhance the individual opportunity to learn and the organizational capacity to innovate. To date, however, these claims remain largely untested. Nevertheless, in several science and engineering domains, virtual organizations are becoming increasingly thought of as indispensable, not only to the advancement of transformational breakthroughs but also to the everyday practice of research and learning. The virtual organization concept has moved beyond pilot projects to the point where many new large-scale projects are underway, despite the fact the forecasted potentialities versus limitations of this new organizational form have not yet been empirically established.

While many virtual organizations are being designed with attention to the information technologies required to be effective, their establishment must also give equal consideration to the social aspects of collaboration that successful virtual organizations will either necessitate or initiate. Technological advances may make virtual organizations possible, but at the core of this revolution is a social transformation. Our ability to leverage the potential of virtual organizations thus depends on our capacity to generate more systematic knowledge about the intertwined social and technical issues of effective virtual organizations, explicating the conditions under which virtual organizations change both how research and education is practiced and what is produced as outcomes.

Proposals submitted under this program solicitation must explain explicitly how the proposed work fits within streams of sociotechnical systems theory and research, so that the potential contribution to one or more fields of research is clear. They must also indicate potential contributions to practice.

Critical challenges and prominent themes that scientific inquiries might address under VOSS may include (but are not limited to):

- Units and frameworks of analysis—both social and technical: Social units of analysis may be individuals, teams, scientific disciplines, individual or multiple organizations. Technical units of analysis may include specific tools or objects, virtual or immersive environments or “worlds,” specialized niches, or collections of such virtual environments. What are the conceptual and comparative frameworks of analyzing virtual organizations? What theoretical, methodological, and empirical approaches can be applied, what need to be adapted, what need to be developed?
- Organizational life cycles: What are the stages and causes of virtual organization evolution, including, for example, formation of new organizations, organizational change or transformation, and organizational crisis or decline? How do they vary across task, domain, population, and/or stage of organization lifecycle?
- Production and innovation: What technological, social, and legal arrangements support intellectual production and innovation in virtual organizations? How do these arrangements interact? How do they vary across task, domain, population, and/or stage of organization lifecycle?
- Organizational structure, scope, and scaling: Are there levels of connectivity, diversity, and interactivity at which scientific production and innovation can be optimized in virtual organizations? How does optimization on these dimensions vary across task, domain, population, and/or stage of organization lifecycle?
- Individual and collective motivation: What are the social and technological barriers to and/or enablers of participation in a virtual organization? What are the social and technological forces of coordination, competition, and/or collaboration? How do these forces vary across task, domain, population, and/or stage of organization lifecycle?
- Management, Governance, and Leadership: What are models of governance agreement, and what should they address? How do they interact with the cultures, structures and arrangements governing the participating individuals and institutions? How do virtual organization and participants understand, negotiate, and prioritize multiple and what might be conflicting memberships?

- Measurement and assessment: What are the tests of efficiency, equity, and effectiveness that can be applied to different types of virtual organizations? How do these conditions vary across task, domain, population, and/or stage of organization lifecycle?
- Comparative performance: Under what conditions do virtual organizations outperform co-located organizations? What tasks or processes can be done or done better by virtual organizations that cannot be done or done as well in co-located organizations, and vice versa? What are the advantages and disadvantages of technological-mediation? Under what conditions (and how) might virtual organizations be instrumented to advance our understanding of certain phenomena better than co-located organizations?

III. AWARD INFORMATION

Pending availability of funds, NSF anticipates making approximately 10 to 15 VOSS awards in FY 2008. These awards will be made as either standard or continuing grants. Award sizes are expected to range from $50,000 to $400,000 in total costs (including indirect costs) for the period of the grant with durations up to three years. This maximum is the total for the duration of the project; it is not a yearly maximum.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Universities and Colleges: Universities and two- and four-year colleges (including community colleges) located and accredited in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI: 2

An investigator may participate as a PI, co-PI, or other senior personnel in no more than two proposals submitted in FY 2008 in response to this program solicitation. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any non-lead collaborative proposal. This restriction applies to this solicitation only and is not meant to inhibit submissions of proposals by investigators to other NSF activities or programs.

For the purposes of this VOSS solicitation, senior personnel include the PI, any co-PIs, and any other researchers actively involved in the scientific or technical management of the project, including sub-awardees. It does not include students, postdoctoral researchers, or consultants who provide specific expertise on a limited portion of the project

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 pubs@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 pubs@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.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

Proposal Cover Sheet. Begin your title with the VOSS acronym. Failure to submit this information may delay or prevent processing. If your project includes **international activities**, you must check the box for “International Cooperative Activities Country Name” that appears under Other Information when the "remainder of cover sheet" is clicked, then select the countries involved. Grants.gov users enter information about international activities in Field 5 of the R&R Other Project Information Form.

Project Summary. Provide a summary description of the VOSS project, including its research direction and key features, in a manner that will be informative to a general technical audience. If the project includes international activities, they should be included in the project summary also. Project Summaries must be written carefully to explicitly point to and detail the two NSF evaluation criteria -- intellectual merit and broader impacts -- in separate paragraphs. **If the project summary does not explicitly address both the intellectual merit and the broader impacts of the proposed activity, the proposal will be returned without review.**

Project Description. All VOSS project descriptions should address the following special criteria. Reviewers will be asked to use these criteria to evaluate the proposals:

Fit to Virtual Organizations as Sociotechnical Systems. The project description should address the expected project significance: how its intellectual merits and broader impacts will add to the fundamental understanding of virtual organizations as a phenomenon with and across relevant fields and how it will enhance the capabilities of people who engage in research and/or education supported by virtual organizations.

Multidisciplinarity and Interdisciplinarity. This VOSS competition does not require interdisciplinary collaborations, although projects that bridge sociotechnical perspectives are highly encouraged. When a project uses or develops approaches and methodologies that link social scientists, technologists, and/or end-users, it should be identified and explained in the project description.

Biographical Sketches. Each proposal must include biographical sketches for all senior investigators, and also include biographical sketches for principal foreign collaborators. All biographical sketches must adhere to the format given in the Grant Proposal Guide (Chapter II.C.2.f, http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg).

Project Budget. The budget justification (up to 3 pages) should explain and justify major cost items. For undergraduate and graduate student participants and postdoctoral associates, include a breakdown of costs by types of participants.

Proposals Involving Multiple Organizations Proposals involving multiple organizations may be submitted in one of two ways: (1) as a single proposal with one organization serving as the lead organization and with support to other organizations provided through subawards, or (2) as a collaborative proposal, where each submitting organization must meet the eligibility

criteria outlined in section IV. Organizations eligible to submit proposals include U.S. universities and colleges, including two- and four-year colleges and community colleges, acting on behalf of their faculty members. In addition, non-profit organizations in the U.S. may submit proposals. Please note that all collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane. Chapter II, Section D.3 of the GPG provides additional information on collaborative proposals.

Proposals Involving Collaborators at Foreign Organizations Proposers are reminded that they must provide biographical sketches of all senior project personnel, including those at foreign organizations. In addition, as supplementary documentation, proposals involving foreign collaborators should provide documentation of a willingness to collaborate through letters of commitment from the international counterpart organizations. Please note that although eligibility for this competition is restricted to U.S. organizations, as described in section IV of this solicitation, collaborations with foreign organizations are also encouraged.

Human Subjects If the project involves human subjects, the Institutional Review Board (IRB) of the submitting organization must certify that the proposed project is in compliance with the Federal Government's "Common Rule" for the protection of human subjects. If IRB approval has been obtained and the date of approval is listed on the cover sheet, no other certification is required. If IRB approval is still pending, submit certification of IRB approval in electronic form as soon as approval is obtained to the cognizant program officer. (The name of this program officer will be listed in the Proposal Status module of FastLane.) Delays in obtaining IRB certification may result in NSF being unable to make an award. For more information regarding the protection of human subjects, consult http://www.nsf.gov/bfa/dias/policy/hsfaqs.jsp.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

C. Due Dates

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

  June 02, 2008

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. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: http://www.grants.gov/CustomerSupport. 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 where they will be reviewed if they meet NSF proposal preparation requirements. 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 who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the 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.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals 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 diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- 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.

Additional Review Criteria:

Fit to Virtual Organizations as Sociotechnical Systems. How will the projects intellectual merits and broader

impacts add to the fundamental understanding of virtual organizations as a phenomenon with and across relevant fields? How will it enhance the capabilities of people who engage in research and/or education supported by virtual organizations?

Multidisciplinarity and Interdisciplinarity. Does the project seek to deploy approaches and methodologies that link social scientists, technologists, and/or end-users?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

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 Federal Demonstration Partnership (FDP) 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/general_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@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 before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. 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 FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Diana Rhoten, Lead Program Director, OD/OCI, NSF, 1145S, telephone: 703-292-8276, fax: 703-292-8976, email: drhoten@nsf.gov
- Wayne Lutters, Program Director, CISE/IIS, NSF, 1125, telephone: 703-292-8930, email: wlutters@nsf.gov
- Mary Lou Maher, Program Director, CISE/IIS, NSF, telephone: (703) 292-8930, email: mmaher@nsf.gov
- Julia I. Lane, Program Director, SBE/SciSIP, NSF, telephone: (703) 292-5145, email: jlane@nsf.gov
- Jacqueline Meszaros, Program Director, SBE/SES, NSF, telephone: 703-292-7261, email: jmeszaro@nsf.gov
- Stephen Nash, Program Director, ENG/EFRI, NSF, telephone: 703-892-7902, email: snash@nsf.gov
- Phillip R. Westmoreland, Program Director, ENG/CBET, NSF, 565, telephone: 703-292-8695, email: pwestmor@nsf.gov
- Arlene DeStrulle, Program Director, EHR/DRL, NSF, telephone: 703-292-5117, email: adestrul@nsf.gov
- Barbara Olds, Senior Advisor, EHR, NSF, telephone: 703-292-5304, email: bolds@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, MyNSF (formerly the Custom News Service) 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 Regional 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. MyNSF also is available on NSF's Website at http://www.nsf.gov/mynsf/.

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.

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 40,000 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 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.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

Send an e-mail to:	pubs@nsf.gov
or telephone:	(703) 292-7827
• **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
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749