Innovations at the Nexus of Food, Energy and Water Systems (INFEWS)

PROGRAM SOLICITATION
NSF 17-530

REPLACES DOCUMENT(S):
NSF 16-524

National Science Foundation

Directorate for Geosciences

Directorate for Engineering

Directorate for Computer & Information Science & Engineering

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Office of International Science and Engineering

Office of Integrative Activities

National Institute of Food and Agriculture

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

March 06, 2017

IMPORTANT INFORMATION AND REVISION NOTES

Track 4 (Education and workforce development project) has been removed. PIs are redirected to the National Science Foundation Research Traineeship Program (16-503).

Provisions for international collaborations. Detailed instructions are provided in the solicitation.

The program description has been slightly revised, principally for clarity.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 17-1), which is effective for proposals submitted, or due, on or after January 30, 2017.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Innovations at the Nexus of Food, Energy and Water Systems (INFEWS)

Synopsis of Program:

Humanity is reliant upon the physical resources and natural systems of the Earth for the provision of food, energy, and water. It is becoming imperative that we determine how society can best integrate across the natural and built environments to provide for a growing demand for food, water and energy while maintaining appropriate ecosystem services. Factors contributing to stresses in the food and energy and water (FEW) systems include increasing regional and social pressures and governance issues as result of land use change, climate variability, and heterogeneous resource distribution. Interconnections and interdependencies associated with the FEW nexus create research grand challenges for understanding how the complex, coupled processes of society and the environment function now, and in the future. To meet these grand challenges, there is a critical need for research that enables new means of adapting to future challenges. The FEW systems must be conceptualized broadly, incorporating physical processes (such as built infrastructure and new technologies for more efficient resource utilization), natural processes (such as biogeochemical and hydrologic cycles), biological processes (such as agroecosystem structure and productivity), social/behavioral processes (such as decision making and governance), and cyber-components (such as sensing, networking, computation and visualization for decision-making and assessment). Investigations of these complex systems may produce discoveries that cannot emerge from research

on food or energy or water systems alone. It is the synergy among these components in the context of sustainability that will open innovative science and engineering pathways to produce new knowledge, novel technologies and predictive capabilities to solve the challenges of scarcity and variability.

The overarching goal of INFEWS is to catalyze well-integrated interdisciplinary and convergent research to transform scientific understanding of the FEW nexus (integrating all three components rather than addressing them separately), in order to improve system function and management, address system stress, increase resilience, and ensure sustainability. The NSF INFEWS initiative is designed specifically to attain the following goals:

1. Significantly advance our understanding of the food-energy-water system through quantitative, predictive and computational modeling, including support for relevant cyberinfrastructure;
2. Develop real-time, cyber-enabled interfaces that improve understanding of the behavior of FEW systems and increase decision support capability;
3. Enable research that will lead to innovative solutions to critical FEW systems problems; and
4. Grow the scientific workforce capable of studying and managing the FEW system, through education and other professional development opportunities.

This initiative enables interagency cooperation on one of the most pressing problems of the millennium - understanding interactions across the FEW nexus - how it is likely to affect our world, and how we can proactively plan for its consequences. It allows the partner agencies - National Science Foundation (NSF) and the United States Department of Agriculture National Institute of Food and Agriculture (USDA/NIFA) and others - to combine resources to identify and fund the most meritorious and highest-impact projects that support their respective missions, while eliminating duplication of effort and fostering collaboration between agencies and the investigators they support.

In addition, NSF and USDA/NIFA are interested in promoting international cooperation that links scientists and engineers from a range of disciplines and organizations to solve the significant global challenges at the nexus of FEW systems. Proposals including international collaboration are encouraged when those efforts enhance the merit of the proposed work by incorporating unique resources, expertise, facilities or sites of international partners. The U.S. team's international counterparts generally should have support or obtain funding through non-NSF sources. To facilitate coordinating research activities between US and international partners, specific collaborative funding opportunities have been developed involving some international partners. These opportunities are listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] and are described in more detail below.

All questions regarding proposal submissions should be directed to INFEWSquestions@NSF.GOV or the program officers listed below.

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.

- Thomas Torgersen, Co-Chair, Directorate for Geosciences, telephone: 703-292-4738, email: ttorgers@nsf.gov

- David Corman, Directorate for Computer & Information Science & Engineering, telephone: 703-292-8754, email: dcorman@nsf.gov

- Robert O'Connor, Directorate for Social, Behavioral & Economic Sciences, telephone: 703-292-7263, email: roconnor@nsf.gov

- James W. Jones, Directorate for Engineering, telephone: (703) 292-4458, email: jwjones@nsf.gov

- Anne-Marie Schmoltner, Directorate for Mathematical and Physical Sciences, telephone: (703) 292-4716, email: aschmolt@nsf.gov

- Lara Campbell, Office of International Science and Engineering, telephone: 703-292-7049, email: lcampbel@nsf.gov

- Leah Nichols,Office of Integrative Activities, telephone: (703) 292-2983, email: lenichol@nsf.gov

- Rachel Melnick, USDA/NIFA, telephone: 202-401-4980, email: rmelnick@nifa.usda.gov

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

- 10.310 --- USDA-NIFA Agriculture and Food Research Initiative
- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 15 to 30

Projects submitted to all tracks must have total budgets less than or equal to $2,500,000.

Estimated Number of Awards:

Track 1: 5 to 10 awards; Track 2: 5 to 10 awards; Track 3: 5 to 10 awards

Both NSF and USDA/NIFA funds will be used to support Tracks 1-3. NSF will share all submitted materials with USDA/NIFA. Some

projects and/or subawards may be funded directly by USDA/NIFA as determined by a joint NSF/USDA decision. If all or a portion of a submitted proposal is determined by NSF and USDA/NIFA to be funded by USDA-NIFA, the lead PI/institution or subawardee will be instructed to update those portions of the proposal that must conform to differing USDA/NIFA guidelines. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

Anticipated Funding Amount: $40,000,000

The total amount available for this solicitation is $40,000,000. Of this amount, NSF anticipates contributing approximately $35,000,000 and USDA/NIFA anticipates contributing approximately $5,000,000. This plan is subject to the availability of funds. This program solicitation is being released prior to the passage of a National Institute of Food and Agriculture appropriations act for FY 2017. Enactment of additional continuing resolutions or an appropriations act may affect the availability of funds or level of funding for this program.

Projects submitted to all tracks must have total budgets less than or equal to $2,500,000. If any proposal exceeds $2,500,000, it will result in "Return Without Review." Funding requests from international partners on this solicitation are independent of and not included in the $2.5M cap. Budget requirements for international partners are discussed here [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp].

This is an interagency partnership between NSF and USDA/NIFA; therefore meritorious proposals may be funded by one or more agencies at the option of the agencies, not the proposer. Both agencies will contribute to and participate in a common review process. All proposals MUST conform to NSF budgetary and proposal submission guidelines by the due dates for each track.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- 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.
- For proposals to be considered for funding under USDA/NIFA: Eligible applicants for the grant program implemented under INFEWS include: (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nationals, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations. Award recipients may subcontract to organizations not eligible to apply provided such organizations are necessary for the conduct of the project.

Who May Serve as PI:

There are no restrictions or limits for the allowable organizations listed above. To be considered as an NSF proposal, federal agencies and federally funded research and development centers (FFRDCs) can participate only as subawardees or unpaid collaborators. FFRDC and federal agency scientists cannot serve as lead PI to be eligible for NSF funding. Non-NSF sponsored FFRDCs are required to provide a letter of support from their agency.

Limit on Number of Proposals per Organization:

There is no limit on the number of proposals per organization. However, there is a limitation on the number of submissions per scientist as noted below.

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

An individual may be lead PI, coPI, Senior Personnel, or Consultant on:

- No more than two proposals and
- No more than one proposal per track.
- If an individual is on 2 proposals in any of these positions, s/he may be a lead PI on ONLY ONE of the two proposals.

These limitations includes proposals submitted by a lead organization or any subaward submitted as part of a proposal.

Please be advised that violations of these rules will result in "return without review" for ALL proposals submitted that include the individual in violation of these rules.

Please note: All materials should be submitted to NSF and must conform to NSF PAPPG guidelines (including budgetary/overhead considerations) at the time of submission. NSF will share all submitted materials with USDA/NIFA. If all or a portion of a submitted proposal is determined by NSF and USDA/NIFA to be funded by USDA-NIFA, the lead PI/institution or subawardee will be instructed to update those portions of the proposal that must conform to differing USDA guidelines. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required

- **Preliminary Proposal Submission:** Not required

- **Full Proposals:**
    - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
    - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:**

    Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

    NSF: No limitations.

    For awards made by USDA/NIFA: Section 715 of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) limits indirect costs on NIFA awards to 30 percent of the total Federal funds provided (or 42.857 percent of total direct costs) under each award. Similar language may be included in the FY 2016 appropriation, therefore, when preparing budgets, you should limit your request for the recovery of indirect costs to the lesser of your institution's official negotiated indirect cost rate or the equivalent of 30 percent of total Federal funds awarded. See Part V section 7.9 of the NIFA Grants.gov Application Guide for further indirect cost information.

- **Other Budgetary Limitations:**

    Not Applicable

C. Due Dates

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

    March 06, 2017

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

TABLE OF CONTENTS

I. INTRODUCTION

Humanity is reliant upon the physical resources and natural systems of the Earth for the provision of food, energy, and water. It is becoming imperative that we determine how society can best integrate across the natural and built environments to provide for a growing demand for food, water and energy while maintaining appropriate ecosystem services. Factors contributing to stresses in the food and energy and water (FEW) systems include increasing regional and social pressures and governance issues as the result of land use change, climate variability, and heterogeneous resource distribution. Interconnections and interdependencies associated with the FEW nexus create research grand challenges for understanding how the complex, coupled processes of society and the environment function now, and in the future. To meet these grand challenges, there is a critical need for research that enables new means of adapting to future challenges. The FEW systems must be conceptualized broadly, incorporating physical processes (such as built infrastructure and new technologies for more efficient resource utilization), natural processes (such as biogeochemical and hydrologic cycles), biological processes (such as agroecosystem structure and productivity), social/behavioral processes (such as decision making and governance), and cyber-components (such as sensing, networking, computation and visualization for decision-making and assessment). Investigations of these complex systems may produce discoveries that cannot emerge from research on food or energy or water systems alone. It is the synergy among these components in the context of sustainability that will open innovative science and engineering pathways to produce new knowledge, novel technologies and predictive capabilities to solve the challenges of scarcity and variability.

The overarching goal of INFEWS is to catalyze well-integrated interdisciplinary and convergent research to transform scientific understanding of the FEW nexus (integrating all three components rather than addressing them separately), in order to improve system function and management, address system stress, increase resilience, and ensure sustainability. The NSF INFEWS initiative is designed specifically to attain the following goals:

1. Significantly advance our understanding of the food-energy-water system through quantitative, predictive and computational modeling, including support for relevant cyberinfrastructure;
2. Develop real-time, cyber-enabled interfaces that improve understanding of the behavior of FEW systems and increase decision support capability;
3. Enable research that will lead to innovative, solutions to critical FEW systems problems; and
4. Grow the scientific workforce capable of studying and managing the FEW system, through education and other professional development opportunities.

This initiative enables interagency cooperation on one of the most pressing problems of the millennium - understanding interactions across the FEW nexus - how it is likely to affect our world, and how we can proactively plan for its consequences. It allows the partner agencies - National Science Foundation (NSF) and the United States Department of Agriculture National Institute of Food and Agriculture (USDA/NIFA) and others - to combine resources to identify and fund the most meritorious and highest-impact projects that support their respective missions, while eliminating duplication of effort and fostering collaboration between agencies and the investigators they support.

In addition, NSF and USDA/NIFA are interested in promoting international cooperation that links scientists and engineers from a range of disciplines and organizations to solve the significant global challenges at the nexus of FEW systems. Proposals including international collaboration are encouraged when those efforts enhance the merit of the proposed work by incorporating unique resources, expertise, facilities or sites of international partners. The U.S. team's international counterparts generally should have support or obtain funding through non-NSF sources. To facilitate coordinating research activities between US and international partners, specific collaborative funding opportunities have been developed involving some international partners. These opportunities are listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] and are described in more detail below.

II. PROGRAM DESCRIPTION

General Requirements

Systems Approach: The INFEWS program defines food and energy and water (FEW) systems as inclusive of physical processes (such as built infrastructure and new technologies for more efficient resource utilization), natural processes (such as biogeochemical and hydrological cycles), agricultural and biological processes (such as agroecosystem structure and productivity), social and behavioral processes (such as decision making and governance), and cyber-components (such as sensing networking, computation, visualization of decision-making and assessment). The INFEWS program also recognizes that FEW systems may appropriately be defined at a wide range of temporal and spatial scales; locally to globally.

Although each proposal does not need to examine all processes listed in the previous paragraph, **proposals submitted to the INFEWS solicitation must define the FEW systems intended for study. The FEW system(s) description should identify the systems boundaries and the primary food and energy and water components that make up the integrated FEW system(s) of the study**. The scope of the problem must include the important and governing components not just those that satisfy the "three components". Proposals that investigate integrated components of two of the three areas, while treating the third as a Broader Impact will not review well, and in some cases, may be returned without review. Successful proposals will define appropriate feedback mechanisms and dynamics among the FEW system components to be studied. Proposals should also identify how the research will account for exogenous inputs to the system, where relevant. PIs should justify their approach in the proposal.

Integration across Disciplines: Proposals submitted to the INFEWS program must demonstrate meaningful integration across disciplines to address the principal objectives outlined below and should go beyond existing approaches that can be addressed

within the individual disciplines and usual core-program co-funded research opportunities at NSF and USDA/NIFA. Although many disciplinary challenges remain in FEW systems research, this solicitation intends to bridge significant existing gaps between disciplinary foci, and to foster new lines of research that emerge only in an interdisciplinary context.

Proposals must document that the proposed research is truly interdisciplinary, that the respective components are fully integrated and necessary for the successful execution of the proposed project, and that the research team contains sufficient expertise to carry out all dimensions of the research plan. Plans for integration of the respective research components must be fully outlined in the proposal.

In order to ensure a sufficiently broad interdisciplinary approach, **INFEWS proposals must integrate and engage the disciplinary science from three or more intellectually distinct disciplines that represent scientific areas typically supported by three or more of the participating NSF directorates (CISE, ENG, GEO, MPS, SBE) or two (or more) directorates and USDA/NIFA.** (USDA/NIFA may be invoked as a "discipline" if the research focus represents a topical area that is uniquely distinct from disciplines typically supported by **participating NSF Directorates (CISE, ENG, GEO, MPS, SBE)**. **The FEW Context Statement should carefully elaborate the specific disciplines as well as the relevant differences between NSF and USDA/NIFA "discipline"). See also Frequently Asked Questions at the end of the solicitation.**

Leverage existing investments: Multiple agencies and universities have established data collection and measurement programs that provide a significant background of information to many potential FEW systems studies. An INFEWS project should utilize such data sources when appropriate and propose the measurement and collection of new data only if they are critical to the FEW system under study.

In addition, pursuing INFEWS and INFEWS-related research topics and projects may require that novel capabilities be added to existing shared cyberinfrastructure to be successful. This solicitation also seeks potential investments that would introduce new capabilities and novel cyberinfrastructure approaches to addressing the scientific challenges inherent in INFEWS research, leading to previously unattainable results.

Partnerships: INFEWS research has natural linkages to federal agencies and a wide spectrum of other stakeholders. Whenever appropriate, **partnerships are encouraged between universities; research centers; federal agencies and national labs; state, local, and tribal governments; and private organizations**. Such partnerships should be considered for improved definition of underlying scientific problems such that effective and impactful approaches may be developed.

NSF and USDA/NIFA are interested in promoting international cooperation that links scientists and engineers from a range of disciplines and organizations to solve the significant global challenges at the nexus of FEW systems. Proposals including international collaboration are encouraged when those efforts enhance the merit of the proposed work by incorporating unique resources, expertise, facilities or sites of international partners. Research may involve any country/countries, but the U.S. team's international counterparts generally should have support or obtain funding through non-NSF sources.

To facilitate coordinating research activities between US and international partners, specific collaborative funding opportunities have been developed involving some international partners. These opportunities are listed here [[https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] and are described in more detail below in Section II under International Collaboration. International funding agencies who partner with NSF on this solicitation may send a representative to attend all panel meetings and listen to review of all proposals, including those with no international components. Full proposals and reviews may be shared with funding agency partners for those proposals involving that partner's country.

Projects submitted to all tracks must have total budgets less than or equal to $2,500,000. If any Track proposal exceeds $2,500,000, it will result in an automatic "Return Without Review." Funding requests from international partners on this solicitation are independent of and not included in the $2.5million cap. Budget requirements for international partners are discussed here [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp].

International Collaboration

NSF has partnered with international partner funding organizations to coordinate research activities between US researchers and those in several other countries. The countries and funding agencies who are collaborating are listed here [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp]. Under the coordinating agreements, these funding agencies may recommend reviewers who may be selected to serve as panelists and may send an observer to attend all review/panel meetings. Partner funding agency observers may listen to discussion of all proposals, including those that do not include international collaboration, and may fully participate in the decision-making process for proposals that include researchers from their countries. Proposals that involve international collaboration with the countries listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] may be shared with the funding agency(s) from the relevant country(s), along with reviews, supplementary documents and other materials needed to reach a funding decision.

Proposals involving international collaboration should clearly describe the work that will be accomplished by the entire team, including the international partners, and how the international partners' efforts will be supported. There are two possible modes of international collaboration:

- Collaboration with researchers in countries listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] in which a partner funding agency may support the funds required by that international collaborator. More details are available at the link listed above, including details on the documents to include in your proposal and budget limits for international partners set by their funding agency(s).

- Collaboration with non-US researchers whose countries are not listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp]. Many international research collaborators, especially in developed countries, have opportunities for support from their own funding agencies even if they are not partners on this solicitation. In addition, developing country collaborators who are working with NSF-funded researchers may be eligible to submit proposals to the Partnerships for Enhanced Engagement in Research (PEER) program, which is funded by USAID and managed by the US National Academies: www.nationalacademies.org/peer. Support should be sought from non-NSF sources wherever possible and the proposal should state how the international partners will pursue support. The NSF budget may include limited funds for services provided by non-US persons only if those services are essential to the success of the project, if they could not be provided by a US-based person or organization, and if an alternative funding source to support that activity is not available.

  Separate from this solicitation, NSF anticipates participating in a call for proposals from the Belmont Forum on global urbanization and the food, energy, water nexus. Information on this separate opportunity may be found here: https://belmontforum.org/

INFEWS Tracks

This solicitation outlines three tracks of research: (1) FEW System Modeling; (2) Visualization and Decision support for Cyber-Human-Physical Systems at the FEW Nexus; and (3) Research to Enable Innovative Solutions. A proposal may be submitted to ONLY ONE track per competition. Proposals submitted to more than one track or proposals that fail to specify a track in the title will be returned without review.

Track 1: FEW System Modeling

Track 1 aims to significantly advance understanding of FEW systems with advanced modeling that investigates the functioning of coupled biotic, abiotic, engineered and social systems. The goal is to define and understand the couplings/linkages, feedback mechanisms and processes among the FEW systems components and to elucidate the factors that influence resilience, thresholds and criticalities. Track 1 projects should articulate clear hypotheses and/or describe what anticipated theoretical advancements will likely emerge from the modeling efforts. These projects should enable innovative perspectives and advances in understanding and modeling complex systems processes. Development of advanced computational methods and effective means for incorporation of large quantities of disparate data, as implemented in new and novel software and tools, is also appropriate.

Projects might use a wide variety of different systems analyses and modeling approaches to explore the functional dynamics of FEW systems. Some projects might integrate across models from multiple disciplinary domains, including, but not limited to agricultural, behavioral, computational, cultural, ecological, economic, energy, engineering, geospatial, hydrological, mathematical, political and social. Projects might also explore disparate types of datasets in order to develop new understandings of FEW relationships, systems and their dynamics. Some of the proposed projects may address additional cyberinfrastructure capabilities that could include advanced computational infrastructure supporting advanced modeling, and/or data integration across multiple scales (including the possibility of real-time sensing)

Systems chosen for study must be examined to define/quantify spatially heterogeneous FEW systems responses to various internal and external driving factors that occur on both short and long timescales. FEW systems operation must be investigated under the influence of single and multiple driving factors. FEW models should allow for investigation of system resiliency, attempt to identify thresholds, and explore system response to variability among critical parameters singly, in combination, or at extreme values.

INFEWS and INFEWS-related research topics and projects may also require novel capabilities to existing shared cyberinfrastructure to be successful. Track 1 projects may introduce new capabilities and novel computing cyberinfrastructure and data integration approaches to address the scientific challenges inherent in INFEWS research, leading to previously unattainable results. Here, the emphasis will be upon extending existing, shared cyberinfrastructure resources (at the campus, regional, or national level) to specifically address the computational cyberinfrastructure challenges associated with the proposed INFEWs research.

Proposed Track 1 project/models must be designed to assess (a) the model's generalizability through either site-to-site comparisons or within site comparisons at multiple time/space scales, or (b) the model's ability to evaluate minimization-of-risk with respect to FEW services, the components/couplings that define threshold and resilient FEW systems behavior and the impact of mitigation and adaptation with respect to minimization-of-risk. Alternately, projects where advanced cyberinfrastructure is the focus, must assess performance and strategic potential of the new cyberinfrastructure, as well as its ability to enable INFEWS research advances.

Track 2: Visualization and Decision Support for Cyber-Human-Physical Systems at the FEW Nexus

Cyber-human-physical systems (CHPS) integrate decision making at different spatial and temporal scales with sensing, computation, and networking measurements of the social, natural, physical and built worlds. From this perspective, INFEWS represents CHPS on a grand scale that is tightly woven between the physical and the human fabrics. Each FEW system is a large CHPS with human interaction influencing system outcomes. Track 2 seeks to develop the core system science needed to understand the interactions between these diverse but closely coupled components that operate at multiple temporal and spatial scales.

CHPS research for the FEW systems nexus will necessitate the research, design, and implementation of new analytic algorithms that will (a) support real-time management, near-real time decision making, and longer term planning; and (b) provide a science basis to aid in policy generation for decision making on week to decadal timescales and across multiple closely integrated systems. Aggregation of multiple data sources and integration of analysis into a comprehensive framework for decision making in the FEW context is required. Finally, all these capabilities must exist within a secure and resilient environment that provides appropriate levels of data privacy. This track seeks open, accessible computing environments and infrastructures to enable suitable response times. Proposals should describe how their research will contribute to improved decision support and include discussion of relevant scenarios. Examples providing proposed visualization and human interaction and quantifying predicted improvement are encouraged. Research challenges include, but are not limited to:

- New methods, and data science algorithms for integrating multiple, heterogeneous, and high-volume FEW data from physical, ecological, engineered, and social sources that facilitate the extraction of actionable information
- ;Innovative, open and scalable computing architectures capable of supporting effective resource management and human decision making
- Modeling approaches and algorithms that can capture FEW component interactions at multiple temporal and spatial scales and support cyber-human-physical system resource management
- ;New approaches to verify cyber-human-physical system behaviors
- Visualization tools for multi-scale and multi-user data and model interpretation and analysis as well as decision support
- Security for multiple levels of the FEW system and their interactions

Track 3: Research to Enable Innovative System Solutions

FEW systems are facing multiple stresses, including, but not limited to, increasing global populations, rapid land use change, shifting social, economic and governance norms, and escalating climate variability. Heterogeneous resource distribution and access, increasing resource scarcity, degraded resource quality, and diminished ecosystem services also challenge long-term FEW systems sustainability. Track 3 projects will develop and examine innovative solutions that address specific FEW system challenges and aim to enhance FEW systems' resilience and sustainability. Research on innovative institutional, behavioral, and technological solutions – and the coupled-combinations of solutions – is needed. Track 3 research might explore sustainable management solutions, examine the drivers of resource consumption, and study the means of extending resources via methods such as reducing, recycling, recovery, and reuse, among other topics.

Track 3 projects must take a systems approach when researching potential solutions. A project that addresses the three components (food, energy, and water) separately, rather than integrating all three in a single system simultaneously, is not appropriate for the INFEWS solicitation. Projects should demonstrate how the envisioned solution will contribute to system-wide improvements across sectors and places accounting for appropriate variabilities across temporal and spatial scales. Solutions may increase stress at certain scales, or during an initial adjustment period, but may prove to reduce key stressors in a broader context or over longer time horizons. Proposers should be cognizant that solutions often imply increased resource investments across differing cultural and legal contexts, and, therefore have the potential to increase systems level stresses and other unintended consequences. Hence, the proposed approaches must identify solutions in a broad systems context beyond the specific proposed solution.

Specific areas of interest include, but are not limited to:

- Governance: Research on the cultural, behavioral, institutional, legal, organizational, political, social, and technological innovations that improve the sustainability, efficiency, equity, and resiliency of FEW systems is needed. Managerial, social, and policy innovations may involve intergovernmental relations as well as formal and informal governance structures. The effectiveness of innovations in one domain may depend on complementary innovations in other domains.
- Efficient Use of Resources: One goal of INFEWS is to address production, consumption and waste. Scientific, engineering, institutional, social, and behavioral solutions to improve FEW systems efficiencies should be coupled with new knowledge of how ecological, economic, social, and physical systems interact. Projects can address production, consumption and waste as well as how these aspects of FEW systems interact with each other in technical and non-technical domains to minimize resource consumption and waste at a systems level.
- Conversion and/or Reuse of Waste Materials: New devices, sensors, catalysts, nanomaterials, smart filters, and processes may be required to detect, remove, destroy or convert compounds of concern from waste streams, or to turn waste constituents into valuable primary or secondary products. A FEW systems approach to these problems may also reveal uses for 'waste' that do not require complete reversion back to pristine conditions. Proposals should either demonstrate or include plans to examine the expected effects of wide-spread adoption of the proposed innovation on the FEW system. Projects should also consider the incentives and obstacles to deployment of such solutions.
- Systems Sustainability: INFEWS aims to enable research on innovative strategies for appropriate management of natural and physical systems. Questions of use, access, and governance will likely be important in this context. Spatial incongruities between the natural and political boundaries of the various component systems and temporal mismatches between decision-making timeframes and systems response and dynamics may also need to be addressed.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant

Estimated Number of Awards: 15 to 30

Anticipated Funding Amount: $40,000,000

The total amount available for this solicitation is $40,000,000. Of this amount, NSF anticipates contributing approximately $35,000,000 and USDA/NIFA anticipates contributing approximately $5,000,000. This plan is subject to the availability of funds. This program solicitation is being released prior to the passage of a National Institute of Food and Agriculture appropriations act for FY 2017. Enactment of additional continuing resolutions or an appropriations act may affect the availability of funds or level of funding for this program.

Projects submitted to all tracks must have total budgets less than or equal to $2,500,000.

Estimated Number of Awards:

Track 1: 5 to 10 awards; Track 2: 5 to 10 awards; Track 3: 5 to 10 awards

Both NSF and USDA/NIFA funds will be used to support Tracks 1-3. NSF will share all submitted materials with USDA/NIFA. Some projects and/or subawards may be funded directly by USDA/NIFA as determined by a joint NSF/USDA decision. If all or a portion of a submitted proposal is determined by NSF and USDA/NIFA to be funded by USDA-NIFA, the lead PI/institution or subawardee will be instructed to update those portions of the proposal that must conform to differing USDA/NIFA guidelines. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- 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.
- For proposals to be considered for funding under USDA/NIFA: Eligible applicants for the grant program implemented under INFEWS include: (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nationals, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations. Award recipients may subcontract to organizations not eligible to apply provided such organizations are necessary for the conduct of the project.

Who May Serve as PI:

There are no restrictions or limits for the allowable organizations listed above. To be considered as an NSF proposal, federal agencies and federally funded research and development centers (FFRDCs) can participate only as subawardees or unpaid collaborators. FFRDC and federal agency scientists cannot serve as lead PI to be eligible for NSF funding. Non-NSF sponsored FFRDCs are required to provide a letter of support from their agency.

Limit on Number of Proposals per Organization:

There is no limit on the number of proposals per organization. However, there is a limitation on the number of submissions per scientist as noted below.

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

An individual may be lead PI, coPI, Senior Personnel, or Consultant on:

- No more than two proposals and
- No more than one proposal per track.
- If an individual is on 2 proposals in any of these positions, s/he may be a lead PI on ONLY ONE of the two proposals.

These limitations includes proposals submitted by a lead organization or any subaward submitted as part of a proposal.

Please be advised that violations of these rules will result in "return without review" for ALL proposals submitted that include the individual in violation of these rules.

Please note: All materials should be submitted to NSF and must conform to NSF PAPPG guidelines (including budgetary/overhead considerations) at the time of submission. NSF will share all submitted materials with USDA/NIFA. If all or a portion of a submitted proposal is determined by NSF and USDA/NIFA to be funded by USDA-NIFA, the lead PI/institution or subawardee will be instructed to update those portions of the proposal that must conform to differing USDA guidelines. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

Additional Eligibility Info:

If one participating unit constitutes an FFRDC and/or another US government agency, expenses associated with participation of those scientists should be consolidated into a single subaward (for each agency). Should the proposal be successful, the full FFRDC financial commitment must be met by the FFRDC or agency; therefore FFRDC and agency submissions should be cleared in advance with the relevant agency and the submission should be supported by an email or letter of commitment from that agency (provided in Supplementary Documents).

Please note: All materials should be submitted to NSF according to NSF PAPPG guidelines and the special changes indicated in this solicitation (and not USDA-NIFA submission guidelines). NSF will share all submitted materials with USDA/NIFA who will fully participate in an agreed-upon review and/or paneling process.

Individual researchers and researchers at ineligible organizations may be included on proposals from eligible institutions through subawards or as consultants.

For proposals to be considered for possible funding by USDA/NIFA: Eligible applicants for the grant program implemented under INFEWS include: (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nationals, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations.

Federal Agencies and FFDRCs should also be aware of the specific Indirect cost (F&A) Limitations for awards made by USDA/NIFA.

Projects involving federal agencies or national laboratories will only be considered for co-funding by NSF if they are cooperative efforts that involve non-federally funded institutions. Proposals from FFRDCs must obey NSF budget guidelines and may not include costs already covered by federal funds. To facilitate possible interagency funding of such collaborations, an institution other than the federal agency or national laboratory must serve as the lead institution.

As a general rule, projects which end up being funded by USDA/NIFA will follow normal operational USDA/NIFA guidelines for agencies and FFRDCs; projects funded under this solicitation by NSF will follow normal operational NSF guidelines for agencies and national laboratories (PAPPG Chapter I.E.7). Under exceptional circumstances, research or education projects at other Federal agencies or FFRDCs that can make unique contributions to the needs of researchers elsewhere or to other specific NSF objectives may receive NSF support. This generally means that other federal agencies and/or FFRDCs should not be the lead organization and specific budgetary restrictions apply per NSF.

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.

See Chapter II.C.2 of the GPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The following instructions supplement or deviate from the guidance in the PAPPG and NSF Grants.gov Application Guide.

Please note: All materials should be submitted to NSF. NSF will share all submitted materials with USDA/NIFA and other participating agencies.

There are specific instructions with regard to Multi-Institutional Proposals, title of Proposal, Co-Review, preparation of "Biographical Sketches", "Results of Prior Research" and "Collaborators and Other Affiliations".

There are also specific instructions for Supplementary Documents with regard to preparation of: Data Management Plan, Postdoctoral Researcher Mentoring Plan, Project Personnel Table, Results of Prior Research, Management Plan, Letters of Support and the FEW Context Statement.

Failure to follow these instructions can result in a proposal being returned without review (RWR).

Special Instructions for the following:

1. Multi-Institutional Proposals
2. Title of Proposal
3. Co-Review
4. Biographical sketches
5. Results of Prior Research
6. Supplementary Documents
7. Single Copy Documents - "Collaborators and Other Affiliations"

Multi-Institutional Proposals: Any proposals involving multiple institutions must be submitted by the lead institution with all other institutions included via subawards. Simultaneous submission of proposals from different institutions (as described under PAPPG Chapter II.D.3) will not be accepted.

Title of Proposal: Submissions will have a title beginning with "INFEWS/T1", "INFEWS/T2" or "INFEWS/T3" depending upon the specific track to which the proposal is submitted (proposals may be submitted to only one track). These lead characters should be followed by any other indicators if appropriate. The title should state clearly and succinctly the focus of the project.

Co-Review: PIs may not request co-review by other tracks or programs at NSF. International partners from the countries and organizations listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] will participate in the review of proposals involving their country(s) and partner agencies will attend all review panels and hear review of all proposals submitted to this competition.

Biographical Sketches: Biographical Sketches of all PIs, co-PIs, senior personnel and consultants (that define the scientific team listed in the Project Personnel Table) should be provided in 'Biographical Sketches' section (preferably in the order presented in the Project Personnel table) of the lead organization's proposal and must adhere to NSF guidelines (refer to PAPPG Chapter II.C.2.f for detailed Biosketch preparation instructions). Biographical sketches for international collaborators should be included. Do not place any biographical sketches in Supplementary Documents.

Results from Prior Research: Note that this should be uploaded as described below. It should not be part of the 15 page description as is indicated in the PAPPG. Results of prior research is not required for international partners unless they have received NSF funding.

Supplementary Documents: These Documents, discussed below, should be provided in the following order:

Document 1: Data Management Plan (up to 2 pages): The Data Management Plan should describe how the project will use and contribute to centralized efforts for data management including model-run output where applicable. The Data Management Plan must be submitted under the specific tab indicated in Supplementary Materials. The following information should be provided:

- The types of data, samples, physical collections, software, and other materials to be produced in the course of the project;
- The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies); in all cases existing publicly accessible data bases should be utilized wherever it is appropriate;
- Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
- Policies and provisions for re-use, re-distribution, and the production of derivatives;
- Plans for archiving data, samples, and other research products, and for preservation of access to them;
- The data management plan is considered an integral part of the project and therefore subject to reviewer, panel, and program evaluation. Successful applicants will be expected to address data management issues in annual and final project reports.

Document 2: Postdoctoral Researcher Mentoring Plan (if Applicable) (up to 1 page): Proposals that request funding to support postdoctoral researchers at any of the participating institutions must include a description of the disciplinary and cross-disciplinary mentoring activities that will be provided for such individuals. Only one single-page is allowed per proposal even if multiple postdoctoral researchers from different institutions are involved. Thus the postdoctoral researcher mentoring plan will be an additional means of providing cross-disciplinary mentoring across institutions and the project as a whole.

The Postdoctoral Researcher Mentoring Plan must be submitted under the specific tab indicated in Supplementary Materials.

Document 3: Other Supplementary Documents (one PDF containing the five documents, preferably in this order; descriptions listed below):

1. Project Personnel Table (Solicitation Addition to the PAPPG requirements).
2. Results from Prior Research (up to four pages, Change in placement from the PAPPG requirements).
3. Management Plan (up to three pages, Solicitation Addition to the PAPPG requirements).
4. Letters of Collaboration.
5. FEW Context Statement (one page, Solicitation Addition to the PAPPG requirements)

1. Project Personnel Table: The Project Personnel Table should specifically list PIs, co-PIs, senior personnel, and consultants) for the proposal. The purpose of the Project Personnel Table is to provide both NSF staff and reviewers information on the roles of each person for these large research groups. It also indicates who should have a biographical sketch, and who should be included in the "Results from Prior Research" section. The PPT Table should be created as a spreadsheet and uploaded as a character recognizable pdf.

   Each proposal should submit ONE Project Personnel Table for their PROJECT. These individuals should be identified as to their responsibility in the Management Plan and should have an NSF-style biosketch included within the "Biographical Sketches" portion of the proposal. The table should include the names of all individuals associated (named) with the project including international participants according to the following template (use landscape layout if needed).

   - Column A: PI, co-PI, Senior Personnel or consultant on project (last name, first name).
   - Column B: Institution of PI, co-PI, senior personnel, or consultant on project.
   - Column C: project role, e.g. lead PI, co-PI, senior personnel, or consultant.

2. Results from Prior Research: "Results from Prior Research" (NSF research) must be provided (preferably in the order of the Project Personnel Table) for all named participating scientists (those appearing in the Project Personnel Table) as a single document of up to four pages and is to be included in Supplementary Documents. Thus, "Results from Prior NSF Research" is not required to be placed into the 15 page project description. "Results of Prior NSF Research" is a requirement of all NSF submitted proposals. Instructions for what is to be included in "Results from Prior Research" are provided in the PAPPG. For some Project Personnel, the phrase "not applicable" may be appropriate.

3. Management Plan (up to 3 pages; submit as a Supplementary Document): The management plan should describe the management, communication and administrative structure with sufficient detail to demonstrate the capability for conducting the proposed work. The Management Plan is a key document used in the review of the proposals. It should identify the roles and responsibilities of all individuals named in the Project Personnel Table and should include an appropriate Gantt Plot describing how the tasks will be integrated over the course of the project.

4. Letters of Collaboration: Applicants needing to document collaborative arrangements (confirmatory of cooperation on the project) or other types of commitments must submit letters of collaboration (as Supplementary Documents). All letters of collaboration must be included at the time of the proposal submission. Letters should confirm that the organization/individual agrees to the responsibilities identified in the project description and the Management Plan. Letters of support that convey an excessive sense of enthusiasm for the project or highlight research team qualifications are not permitted. It should NOT be a letter of endorsement but rather a commitment to the participation as defined in the project description. Submission of a letter of collaboration is not the same as submitting a separately submitted collaborative proposal (which is NOT ALLOWED under this solicitation).
5. FEW Context Statement (up to one page, placed in the Supplementary Documents): The context statement will briefly summarize key elements of the proposal and must contain the following information:

   - the persuasive reasons why the research is to be undertaken and how the work will significantly enhance knowledge of FEW systems.
   - an explanation and definition of the food and energy and water systems the work is addressing and why the overall system to be studied is of importance.
   - define and specifically name the (at least) three disciplines that will be engaged and integrated in the project. The three or more intellectually distinct disciplines must represent scientific areas typically supported by three or more of the participating NSF directorates (CISE, ENG, GEO, MPS, SBE) or two (or more) directorates and USDA/NIFA. (USDA/NIFA may be invoked as a "discipline" if the research focus represents a topical area that is uniquely distinct from disciplines typically supported by participating NSF Directorates (CISE, ENG, GEO, MPS, SBE). The FEW Context Statement should carefully elaborate the specific disciplines as well as the relevant differences between NSF and USDA/NIFA "discipline"). See also Frequently Asked Questions at the end of the solicitation.

The FEW Context Statement is an important component of the submission and review process. It is not a project summary, it is not a synopsis; it is a critical document specifically addressing the points noted above. Proposals that do not contain a FEW Context Statement with the appropriate information will be subject to return without review.

Budget Request from International Partner Agency(s). For proposals involving international collaborators from countries listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp], the budget request to the partner funding agency to support personnel and/or research in that country should be provided as a supplementary document. Further details on materials to submit are at the website above. The $2.5M cap applies ONLY to the budget request from NSF. Budget limitations and requirements for international partners whose funding agencies are participating in this call are described at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp].

Other Considerations: Where appropriate, investigators are encouraged to work in association with existing projects, observational networks, experimental watersheds, long-term ecological research sites or research centers, or testing and evaluation facilities, whether supported by NSF or other agencies, such as USEPA, USGS, USDA/NIFA, ARS or NOAA. In such proposals, the project description should make clear how the proposed work differs from and augments activities already supported. A letter stating the specifics of cooperation or support from the ongoing activity for the proposed project should be included as Supplementary Documents.

Single Copy Documents

Collaborators and Other Affiliations Information. *For this solicitation, and in lieu of instructions in the PAPPG Chapter II.C.1.e, the Collaborators and Other Affiliations Information should be prepared and submitted as follows.*

A **Collaborators and Other Affiliations Matrix Table** should be uploaded as the "Collaborators and Other Affiliations Information" document according to the guidelines below (created as a spreadsheet and uploaded as a character recognizable pdf).

The Collaborators and Other Affiliations Matrix Table should specifically list PIs, coPIs, senior personnel, and consultants for the proposal, including international participants.

These individuals are named in the Project Personnel Table that is provided as a Supplementary Document and biographical

sketch(es) for these individuals are provided in the Biographical Sketch(es) section of the proposal. If your project has named an advisory committee or has letters of collaboration, the named members of the advisory committee should be listed on the spreadsheet, as should the signatories of the letters of collaboration.

Collaborators and other affiliations to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, (3) co-editors within the past 24 months, (4) spouse or other relative(s), and (5) any other individuals with whom, or institutions with which, the PI, co-PIs, Senior Personnel or consultants have a business or financial relationship, including advisory committees (please specify type). If submitting via Grants.gov, complete the information and attach as a character recognizable PDF file (see Field 5, Additional Single Copy Documents, on the NSF Grant Application Cover Page).

The Collaborators and Other Affiliations Matrix Table must include the information according to the following template (Please provide the Collaborators and Other Affiliations Matrix alphabetized by Column A then Column C). Use landscape layout if needed:

- Column A: PI, co-PI, Senior Personnel or consultant on project (last name, first name). If your project has named an advisory committee or has letters of collaboration, the named members of the advisory committee should be listed on the Collaborators and Other Affiliations Matrix as should the signatories of letters of collaboration (last name, first name).
- Column B: Institution of individuals named in column A.
- Column C: name of person with whom there is a collaboration or other affiliation for the person in column "A" (last name, first name). Named members of the advisory committee or signatories providing letters of collaboration do NOT need to provide this information.
- Column D: institution/employer of person in column "C"
- Column E: type of collaboration or other affiliation

INFEWS Proposal Checklist

1. Cover Sheet (See PAPPG)
2. Project Summary (See PAPPG)
3. Project Description (See PAPPG – **Note change**: "Results from Prior Research" is NOT included in the 15 page limit for this solicitation).
4. References Cited (See PAPPG)
5. Biographical Sketch(es) (See PAPPG. **Please load them in the same order as they appear in the Project Personnel Table**).
6. Proposal Budget (See PAPPG. Please note that all proposal budgets MUST comply with NSF policy at the due date). Note also that Budgets submitted must include AT LEAST one person trip per year to the Washington D.C. area over the lifetime of the project to represent the project at the annual INFEWS PI meeting. Budget for more than one PI meeting trip or travel by more than one project participant is allowed.
7. Current and Pending Support (for all PIs, Co-PIs, and Senior Personnel – See PAPPG)
8. Facilities, Equipment, and Other Resources (See PAPPG)
9. Supplementary Documents

    - Data Management Plan (See PAPPG)
    - Postdoctoral Researcher Mentoring Plan (if applicable – see PAPPG)

10. Other Supplementary Docs (in order each part should appear)
    A. Project Personnel Table (addition for this solicitation)
    B. Results of Prior Research (Previously this was in the Project Description – it has been moved to this section for this solicitation only)
    C. Management Plan (addition for this solicitation)
    D. Letters of Collaboration
    E. FEW Context Statement
    F. For projects that will include a request for funds from an international partner described here [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp], the budget request from that international partner should be included as a supplementary document.
11. Single Copy Documents (1 separate PDF file):

- Collaborators and Other Affiliations Matrix – (addition for this solicitation, and replaces "Collaborator and Other Affiliations Information" Sections of the PAPPG).

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Indirect Cost (F&A) Limitations:

Proposals should be submitted with negotiated indirect costs for NSF. If a proposal or part of a proposal is selected for funding by USDA/NIFA, PIs will receive further instruction. For awards made by USDA/NIFA: Section 713 of the Consolidated Appropriations Act, 2016 (Pub. L. 114-113) limits indirect costs to 30 percent of the total federal funds provided (or 42.857 percent of total direct costs) under each award. Similar language may be included in the FY 2017 appropriation, therefore, when preparing budgets, you should limit your request for the recovery of indirect costs to the lesser of your institution's official negotiated indirect cost rate or the equivalent of 30 percent of total Federal funds awarded. See Part V section 7.9 of the NIFA Grants.gov Application Guide for further indirect cost information.

Budget Preparation Instructions:

If one participating unit constitutes an FFRDC and/or another US government agency, expenses associated with participation of those scientists should be consolidated into a single subaward (for each agency). Should the proposal be successful, the full FFRDC financial commitment is to be met by the FFRDC agency. It is thus necessary that FFRDC submissions should be cleared in advance with the relevant agency and the submission should be supported by an email confirmation from that agency (in the Supplementary Documents section).

Budgets submitted must **include AT LEAST one person trip per year to the Washington D.C. area over the lifetime of the project** to represent the project at the annual INFEWS PI meeting. Budgeting for more than one PI meeting trip or travel by more than one project participant is allowed.

C. Due Dates

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

    March 06, 2017

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

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

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

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which

projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the National Science Board merit review criteria, reviewers will be asked to apply the following program-specific criteria when reviewing INFEWS proposals.

- Systems Approach: How well does the proposal incorporate and integrate across food, water, and energy systems? Are the proposed study systems appropriately defined?
- Interdisciplinary Integration: How well do the proposed research activities integrate across at least three or more intellectually distinct disciplines that, in aggregate, represent scientific areas supported by three or more of the participating NSF Directorates or two Directorates and USDA/NIFA. (USDA/NIFA may be invoked as a "discipline" if the research focus represents a topical area that is uniquely distinct from disciplines typically supported by NSF Directorates. See also Frequently Asked Questions (FAQ) at the end of the solicitation.
- Does the research team include sufficient expertise to carry out the interdisciplinary research?

B. Review and Selection Process

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

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

The program may implement a two-stage panel review process, depending on the number and breadth of proposals received. During a first review stage, groups of thematically similar proposals would undergo panel review. The program's management team would consider the panels' advice and, if warranted, select proposals to move on to a second stage of review. Proposals not selected for further consideration may be declined at this point.

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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

USDA/NIFA

Applicants selected for funding by USDA/NIFA will be required to provide additional information in accordance with policies and procedures of the Agriculture and Food Research Initiative (AFRI) program. Applications selected for funding by NIFA will be forwarded to the USDA/NIFA Awards Management Division for award processing in accordance with the USDA/NIFA procedures.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

NSF: 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).

USDA/NIFA

The award document will provide pertinent instructions and information including, at a minimum, the following:

1. Legal name and address of performing organization or institution to whom the Director has issued an award under the terms of this request for applications;
2. Title of project;
3. Name(s) and institution(s) of PDs chosen to direct and control approved activities;
4. Identifying award number assigned by the Department;
5. Project period, specifying the amount of time the Department intends to support the project without requiring recompetition for funds;
6. Total amount of Departmental financial assistance approved by the Director during the project period;
7. Legal authority (ies) under which the award is issued;
8. Appropriate Catalog of Federal Domestic Assistance (CFDA) number;
9. Applicable award terms and conditions (see http://www.nifa.usda.gov/business/awards/awardterms.html to view NIFA award terms and conditions);
10. Approved budget plan for categorizing allocable project funds to accomplish the stated purpose of the award; and
11. Other information or provisions deemed necessary by NIFA to carry out its respective awarding activities or to accomplish the purpose of a particular award.

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative

agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

Special Award Conditions:

Awardees may be required to participate in program-level evaluation by which NSF can assess implementation processes and progress toward outcomes overall. NSF or a NSF contractor on behalf of NSF, may periodically conduct program evaluations or special projects that necessitate access to project level staff and data. This may occur at any time during the grant period and could occur after the grant has ended. Project-level participation includes limited burden--responding to inquiries, interviews and other methods of common data collection and/or aggregation across individual grants. In addition, PIs may be asked to assist in developing a program evaluation that will mutually benefit the agency and program participants.

USDA/NIFA

Awards issued as a result of this RFA will have designated the Automated Standard Applications for Payment System (ASAP), operated by the Department of Treasury's Bureau of the Fiscal Service, as the payment system for funds. For more information see https://www.fiscal.treasury.gov/fsservices/gov/pmt/asap/asap_home.htm..

Several federal statutes and regulations apply to grant applications considered for review and to project grants awarded under this program. These may include, but are not limited to, the ones listed on the NIFA web page - http://nifa.usda.gov/federal-regulations.

NIFA Federal Assistance Policy Guide—a compendium of basic NIFA policies and procedures that apply to all NIFA awards, unless there are statutory, regulatory, or award-specific requirements to the contrary is available at http://nifa.usda.gov/policy-guide.

Other Requirements

USDA/NIFA:

1. **Delegation of Fiscal Responsibility**

   Unless the terms and conditions of the award state otherwise, awardees may not in whole or in part delegate or transfer to another person, institution, or organization the responsibility for use or expenditure of award funds.

2. **Changes in Budget or Project Plans**
   In accordance with 2 CFR 200.308, awardees must request prior approval from NIFA for the following program or budget-related reasons:
   i. Change in the scope or the objective of the project or program (even if there is no associated budget revision requiring prior written approval).
   ii. Change in a key person specified in the application or the federal award.
   iii. The disengagement from the project for more than three months, or a 25 percent reduction in time devoted to the project, by the approved project director or principal investigator.
   iv. The inclusion, unless waived by the federal awarding agency, of costs that require prior approval in accordance with 2 CFR 200 Subpart E—Cost Principles of this part or 45 CFR Part 75 Appendix IX, "Principles for Determining Costs Applicable to Research and Development under Awards and Contracts with Hospitals," or 48 CFR Part 31, "Contract Cost Principles and Procedures," as applicable.
   v. The transfer of funds budgeted for participant support costs as defined in §200.75 Participant support costs to other categories of expense.
   vi. Unless described in the application and funded in the approved federal awards, the subawarding, transferring or contracting out of any work under a federal award, including fixed amount subawards as described in §200.332 Fixed amount subawards. This provision does not apply to the acquisition of supplies, material, equipment, or general support services.
   vii. Changes in the approved cost-sharing or matching provided by the non-federal entity.
   viii. The need arises for additional federal funds to complete the project.

The awardee will be subject to the terms and conditions identified in the award. See http://www.nifa.usda.gov/business/awards/awardterms.html for information about NIFA award terms

Changes in Approved Budget: Changes in an approved budget must be requested by the grantee and approved in writing by the ADO prior to instituting such changes if the revision will involve transfers or expenditures of amounts requiring prior approval as set forth in the applicable Federal cost principles, Departmental regulations, or grant award.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 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.

USDA/NIFA:

The output and reporting requirements are included in the award terms and conditions (see http://www.nifa.usda.gov/business/awards/awardterms.html for information about NIFA award terms). If there are any program or award-specific award terms, those, if any, will be identified in the award.

Additional Reporting Requirements

- For awards funded by NSF, PIs will be required to include descriptions of their project milestones and their data management activities in their annual reports. Data reporting should conform to current NSF data policy guidelines; PIs should consult with the PAPPG.
- For awards funded by USDA/NIFA, reporting requirements for awards funded will conform to those specified by USDA/NIFA.
- For projects that are funded by NSF and USDA/NIFA, the annual report of the lead project in the collaborative must be resident at NSF and must include a description of the activities and milestones of the parts of the project that are funded by the other agencies.
- When a project is funded by both agencies, the NSF-lead institutions should submit a unified annual report and the USDA/NIFA funded portion of the project should include the NSF-unified annual report as part of its USDA/NIFA annual report (see also FAQ).

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:

- Thomas Torgersen, Co-Chair, Directorate for Geosciences, telephone: 703-292-4738, email: ttorgers@nsf.gov

- David Corman, Directorate for Computer & Information Science & Engineering, telephone: 703-292-8754, email: dcorman@nsf.gov

- Robert O'Connor, Directorate for Social, Behavioral & Economic Sciences, telephone: 703-292-7263, email: roconnor@nsf.gov

- James W. Jones, Directorate for Engineering, telephone: (703) 292-4458, email: jwjones@nsf.gov

- Anne-Marie Schmoltner, Directorate for Mathematical and Physical Sciences, telephone: (703) 292-4716, email: aschmolt@nsf.gov

- Lara Campbell, Office of International Science and Engineering, telephone: 703-292-7049, email: lcampbel@nsf.gov

- Leah Nichols, Office of Integrative Activities, telephone: (703) 292-2983, email: lenichol@nsf.gov

- Rachel Melnick, USDA/NIFA, telephone: 202-401-4980, email: rmelnick@nifa.usda.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.

All questions regarding proposal submissions should be directed to INFEWSquestions@NSF.GOV

IX. OTHER INFORMATION

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

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

USDA-NIFA requires a Felony Convictions or Tax Delinquent Status certification. Additional information will be provided prior to award if selected for funding.

Responsible and Ethical Conduct of Research: For information about the Responsible and Ethical Conduct of Research, see http://nifa.usda.gov/responsible-and-ethical-conduct-research.

The USDA-NIFA authority for this solicitation is contained in section 2(b) of the Competitive, Special, and Facilities Research Grant Act (7 U.S.C. 450i(b)), of the Agriculture and Food Research Initiative (AFRI). AFRI authorizes the Secretary of Agriculture to award competitive grants for fundamental and applied research, extension, and education to address food and agricultural sciences. AFRI awards are subject to the NIFA regulations found at 7 CFR Part 3430. NIFA's authority to participate in the issuance of a joint RFA is 7 U.S.C. § 3319b.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

About the National Institute of Food and Agriculture

The National Institute of Food and Agriculture (NIFA) is an agency within the U.S. Department of Agriculture (USDA), part of the executive branch of the Federal Government. Congress created NIFA through the Food, Conservation, and Energy Act of 2008. NIFA replaced the former Cooperative State Research, Education, and Extension Service (CSREES), which had been in existence since 1994. NIFA's unique mission is to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the Land-Grant University System and other partner organizations. NIFA doesn't perform actual research, education, and extension but rather helps fund it at the state and local level and provides program leadership in these areas. Through grants offered by NIFA, the USDA enables researchers throughout the United States to solve problems critical to our farmers, consumers, and communities. NIFA is the USDA's major extramural research agency, funding individuals, institutions, and public, private, and non-profit organizations. NIFA's education programs supports and promotes teaching excellence, enhances academic quality, and develops tomorrow's scientific and professional workforce. In cooperation with public institutions, private sector partners, and the Land-Grant University System, NIFA provides national leadership to address critical educational issues. NIFA's extension projects deliver science-based knowledge and informal educational programs to people, enabling them to make practical decisions.

NIFA Web site:

http://www.nifa.usda.gov/
Phone: (202) 720-4423

Street Address:

National Institute of Food and Agriculture
Waterfront Centre
800 9th St. SW., Washington, DC 20024

Mailing Address:

United States Department of Agriculture
National Institute of Food and Agriculture
1400 Independence Avenue SW., Stop 2201
Washington, DC 20250-2201

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

- **TDD (for the hearing-impaired):** (703) 292-5090

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

X. APPENDIX

INFEWS Frequently Asked Questions (FAQs)

About Disciplinary Requirements

1. **What is meant by interdisciplinary INFEWS research?**

   Proposals are expected to document that the proposed research is truly interdisciplinary and that the respective components are fully integrated and of high relevance for the successful execution of the proposed project. Plans for integration of the respective research components must be clearly described in the proposal and reinforced within the management plan. In order to ensure a sufficiently broad interdisciplinary approach, **INFEWS proposals must integrate and engage the disciplinary science from three or more intellectually distinct disciplines that represent scientific areas typically supported by three or more of the participating NSF directorates (CISE, ENG, GEO, MPS, SBE) or two (or more) directorates and USDA/NIFA.** (USDA/NIFA may be invoked as a "discipline" if the research focus represents a topical area that is uniquely distinct from disciplines typically supported by **participating NSF Directorates (CISE, ENG, GEO, MPS, SBE)**. **The FEW Context Statement should carefully elaborate the specific disciplines as well as the relevant differences between NSF and USDA/NIFA "discipline". See also Frequently Asked Questions at the end of the solicitation.** The scope of the project problem must include important and governing components of the FEW system under study and not just a token three components that satisfy the "three disciplines" rule. Proposals that investigate integrated components of two of the three areas, while treating the third as Broader Impact will not review well, and in some cases, may be returned without review. Successful proposals will define appropriate feedback mechanisms and dynamics among the FEW systems components to be studied. Proposals should also identify how the research will account for exogenous inputs to the systems, where relevant. Proposals should justify their approach. The FEW Context Statement (see below) should carefully elaborate on the specific differences between an NSF and USDA/NIFA "discipline".

2. **My proposal encompasses agricultural research that is relevant to USDA/NIFA. Can I use USDA/NIFA supported research to satisfy the interdisciplinary requirement?**

   Yes; research supported by USDA/NIFA can count as one of the three required disciplines. However, it is important that each of the disciplines included in the proposal are distinctly different. For example, if you are focusing on agricultural engineering research, then you can consider the ENG Directorate as one of the disciplines and then you will need to incorporate research from at least two other directorates (i.e., CISE, GEO, MPS, SBE, USDA/NIFA). You would not be able to count agricultural engineering as both an ENG discipline and a NIFA discipline. Additionally, because the BIO Directorate is not a participant in this solicitation, all "biological" disciplinarity must be satisfied by use of an appropriate USDA/NIFA programmatic area (see list https://nifa.usda.gov/resource/frequently-asked-questions-nsfusda-nifa-joint-solicitation-innovations-nexus-food-energy).

3. **To cover the disciplinary requirements, can I include more than three disciplines in my proposal?**

Yes. You may include as many disciplines as needed to address the key science questions posed by your FEW systems research project. At a minimum, the research needs to reflect scientific areas that are unique to at least three participating NSF Directorates or two Directorates and one USDA/NIFA science. You may also incorporate science from other disciplines not supported by the participating directorates, as long as it is the "fourth" discipline.

4. **If the research and methodologies described in my proposal integrate three very different intellectual fields that are classified under one or two NSF Directorates, can this still satisfy the disciplinary requirements?**

No. You need to incorporate three distinct disciplines that fall under the scope of three different Directorates (i.e. CISE, ENG, GEO, MPS, SBE) (or two directorates and USDA/NIFA as explained above) to ensure compliance with the solicitation requirements.

For example, if your proposed research includes ethnographic methods (by a cultural anthropologist), game theoretic work (from an economist), algorithms (by a computer scientist), and policy analysis across different third-world countries (by a political scientist), it would be considered under the purview of two NSF Directorates: CISE (computer science) and SBE (economics, cultural anthropology, and political science). To satisfy the disciplinary requirements, a third discipline that falls under the scope of another Directorate (i.e. ENG, GEO, and MPS) must be integrated into the proposed research.

5. **My proposal includes a significant educational component. Can I count this as one of the three disciplines needed to satisfy the interdisciplinary requirement?**

The Directorate of Education and Human Resources (EHR) is not participating in this solicitation and thus cannot be used to satisfy one of the "three disciplines".

6. **I see the Office of International Science and Engineering is participating in this solicitation. Can I count the international component of my proposal as one of the three disciplines needed to satisfy the interdisciplinary requirement?**

No. While the Office of International Science and Engineering and the Office of Integrative Activities are participating in this solicitation, these offices are not research directorates. Proposals that address the interests of these offices are welcome, but such components cannot be counted as one of the three scientific disciplines needed to satisfy the interdisciplinary requirement.

7. **What is the preferred contribution level that should be provided by each project participant/discipline?**

There are no specific requirements for the relative distribution of disciplinary expertise yet each component should be included at a level commensurate with the problem scope. However, the disciplinary science should be significant and of high relevance to the FEW systems under study and should not appear as token participation. Each discipline must be an active and integrated aspect of the project. For example, a simple switch of crop-for-food vs crop-as-biofuels may not represent well the controlling components of the system. For biofuels, a significant economic and production constraint is location of the crop relative to the biofuels production facility. This controls economic feasibility and farmer choice.

The project team should be developed in accordance with the specific project objectives. Strong and well-defined interdisciplinary integration are an important element of the INFEWS program. The appropriateness of the research team's disciplinary composition and expertise will be factors in the merit review of the proposals. See Additional Review Criteria Section for more information.

About the Scope of Research

1. **I noticed that throughout the solicitation, FEW systems are described in plural (i.e. systems versus system). Does this mean my project must study more than one system or can I focus on a single system?**

The solicitation is written using "systems" as a plural noun because all proposals submitted to the INFEWS program must outline plans to examine the intersections of food and energy and water systems. It is important to define the specific systems as well as the system of systems that will be addressed by the project and why it is important in the understanding of FEW systems operations and complexity.

2. **Can my FEW systems research be place-based, location-specific, or context-dependent or must it have more comprehensive applications?**

The generalizability of models and results is an important consideration of the INFEWS program. While studies of the interactions among food and energy and water systems in a single location are within the scope of the solicitation, proposals should articulate how the results and outcomes of such a project will be applicable or generalizable in a much broader context.

3. **Should proposals be focused exclusively on FEW systems or can proposals investigate more comprehensive topics, like Sustainable Development, where FEW systems might represent a sub-focus that is critical to the project's success?**

For this solicitation, proposals must focus on food and energy and water systems. Sustainability research could qualify if it is multi-disciplinary (i.e. it includes three or more scientific disciplines as stated in the solicitation) and is targeted towards the complex role of FEW systems in a broader context.

4. **I would like to study the health dimensions of FEW systems. Is this feasible under the INFEWS program?**

You will need to make sure that the project meets NSF requirements. For example, the NSF supports research that examines the social, behavioral, and/or physical and engineering dimensions of systems that cause adverse health outcomes. However, medical or clinical research cannot be supported by NSF and thus "health" cannot be specifically identified as one of the three requisite "distinct disciplines". INFEWS could support a project that includes a sociologist or an epidemiologist who plans to quantify adverse health outcomes of people within a FEW system or systems. Similarly, INFEWS could support a project that incorporates plans to examine the hydrological, ecological, or behavioral processes that spread pathogens or other contaminants (e.g. chemicals, nanoparticles, microplastics) within FEW systems. However, a project that includes plans to examine specific disease processes or clinical investigations will not be supported. See PAPPG for further guidance.

5. **I want to use FEW systems modeling (Track 1) to explore an innovative systems solution (Track 3). How should I decide whether to submit to Track 1 or to Track 3?**

Intellectually and with respect to the FEW Nexus, there is a degree of overlap across the various tracks. This is the nature

of the problem. The best approach is to review the solicitation carefully and determine which track is the most appropriate fit for your research; i.e., the track that applies to the project's more impactful science. It is specifically necessary to identify the track (in the title and justified elsewhere) for which the proposal is most competitive. Please note that proposals cannot be submitted to more than one track.

6. **Is Track 3 limited to research on new and innovative solutions or is it possible to develop advances that build upon existing approaches and technologies?**

   Track 3 proposals may lead to advances in existing systems, develop new solutions, or explore alternative or novel applications for the current state-of-the-art. It is important that Track 3 proposals adopt a systems approach that incorporates foundational or transformative research related to at least three disciplines. In preparing your proposal, bear in mind that it will be reviewed using NSF's intellectual merit review criteria. Therefore, proposals must advance knowledge (element 1) and should be creative, original, and/or potentially transformative (element 2). While Track 3 proposals may certainly develop or use approaches that build upon existing methods, strategies, and/or technologies, proposals should clearly demonstrate how the project is novel and will advance knowledge.

7. **If a project that explores social, behavioral, or economic solutions and/or linkages among food and energy and water systems, does it meet the requirements of this solicitation?**

   INFEWS defines FEW systems very broadly, incorporating physical processes (such as built infrastructure and new technologies for more efficient resource utilization), natural processes (such as biogeochemical and hydrologic cycles), biological processes (such as agroecosystem structure and productivity), and social and behavioral processes (such as decision making and governance), and cyber-elements. Therefore, proposals that examine social, behavioral, or economic solutions and/or linkages among FEW systems are encouraged – as long as the projects sufficiently integrate across multiple disciplines (see solicitation for interdisciplinary requirements) and appropriately explore linkages across the various disciplinary dimensions.

8. **I am interested in proposing advanced cyberinfrastructure enabling research in Food and Energy, and Water. Can you provide insights into the cyberinfrastructure emphasis in the solicitation?**

   The emphasis should be upon extending existing, shared cyberinfrastructure resources (at the campus, regional, or national level) to specifically address the cyberinfrastructure challenges identified by the proposed INFEWS project and the FEW nexus problem. The proposal must emphasize innovative infrastructure, and would utilize expertise in the cyberinfrastructure community (e.g., existing computing centers, Major Research Instrumentation awards, cloud use). The project must also be connected to the community/ideas/needs of the FEW problem, and should enhance integration across FEWs domains. Funding support may include O&M (operations and maintenance) as well as advanced computational equipment, and the equipment may include computing hardware, cloud capabilities, or some combination of hardware and tools.

   The resulting infrastructure will not be merely an upgrade or testbed. The project is expected to provide new cyberinfrastructure configurations and new cyberinfrastructure capabilities that address key cyberinfrastructure challenges and enhance integration across the FEW community.

   Successful proposals where advanced cyberinfrastructure is the focus must assess the performance and strategic potential of the new cyberinfrastructure, as well as its ability to enable INFEWS research advances.

9. **The solicitation provides guidance on leveraging existing investments. Does this mean I have to use previously published or publicly available data?**

   Given the funds that will be available to any one project (not more than $2,500,000), leveraging your project plan off existing data sources will advantage the scope and breadth of the research that can be undertaken. Multiple agencies and universities have established data collection and measurement programs that provide a significant background of information to many potential FEW systems studies. Your project should use such relevant data sources and propose the measurement and collection of new data only if they are critical the FEW system under study.

10. **What project duration is allowable for project submitted under this solicitation?**

    For projects submitted under this solicitation, 3-5year durations are the most likely although shorter duration projects may in some cases be viable. In all cases the project duration should be consistent with the scope of work.

About the Team

1. **Is there a limit to how large my team can be? Likewise, is there a minimum size?**

   The team size depends on the overall scope of the project, in addition to the project's budgetary and practical constraints. There are no specific limits on the minimum or maximum number of participants yet there is a difference between projects that are allowable and projects that are highly competitive.

2. **How many proposal submissions can I be on? For example, is it feasible to serve as the PI on one proposal, a co-PI on a second proposal, and an unpaid consultant on a third proposal?**

   For this solicitation, the maximum number of proposals that any individual can serve on is TWO per competition (this solicitation). Additionally, an individual may be PI, coPI, Senior Personnel, or Consultant on no more than two proposals per competition (this solicitation) and no more than 1 proposal per track. This limitation includes proposals submitted by a lead organization or any subaward submitted as part of a proposal.

3. **I am a researcher at a Federally Funded Research and Development Center (FFRDC) (or a federal agency). May I submit a proposal or serve as a co-PI?**

   To be eligible for NSF funding or co-funding, you can only participate on a proposal only as part of a sub-award or via a letter of collaboration. If you submit a proposal as a PI, you are only eligible for the portion of funding that USDA/NIFA is contributing.

4. **Are PIs from the National Center for Atmospheric Research (NCAR), an NSF-sponsored FFRDC, permitted to submit proposals to INFEWS?**

   NCAR scientists are not permitted to submit proposals to INFEWS. NCAR participation can only be as a subaward (or via a letter of collaboration) and is subject to two conditions: (1) NCAR's participation must be consistent with the NCAR mission, (2) NCAR's participation is expected to be in partnership with non-FFRDC organizations with NCAR participation as a subaward. As an NSF-sponsored FFRDC, the letter of NSF commitment is not required.

5. **Can an INFEWS project involve international research and/or involve international collaborators?**

INFEWS projects can involve international research. The challenges and complexities of FEW systems are global, therefore international collaborations are encouraged where appropriate. International collaborators, however, must seek support from their respective funding organizations, and not NSF. Funding guidelines for involving international collaborators (see Budgetary Information section of the INFEWS solicitation) allow only the following expenses to be included in the NSF budget: 1) Travel expenses for U.S. scientists and students participating in exchange visits integral to the project; 2) Limited project-related expenses for international partners to engage in research activities while in the United States as project participants; 3) costs for specific services provided by an international partner that are essential to the success of the project and cannot be provided by a U.S. person or institution; and 4) project-related expenses for U.S. participants to engage in research activities while abroad.

6. **Are there opportunities for private sector participation in this solicitation?**

Private sector businesses or individuals can participate as subawardees or consultants on projects; they cannot serve as the lead organization.

7. **I would like to include undergraduate students in my project. How do I incorporate a Research Experiences for Undergraduates (REU) experience within my proposal?**

Incorporation of an REU experience within a proposal is an effective mechanism to integrate undergraduate educational activities into a research project. The Research Experiences for Undergraduates (REU) solicitation (NSF 13-542) notes that support for undergraduate students involved in carrying out research under NSF awards should be included as part of the research proposal itself instead of as a post-award supplement to the research proposal. Please consult the REU solicitation for further details.

8. **I would like to propose work with an international collaborator. Can I include funds for my international partner in my NSF budget?**

If your international collaborator is based at an institution in a country listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] s/he can request funds from her/his own funding agency(s) as described at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp]. The US funding limit is $2.5M and the funding limits for the work supported by the international partner(s) is described at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp]. The proposal should describe the work that the entire team, US and international, will accomplish together. The budget request to the international partner should be provided as a supplementary document.

If your international collaborator is not from a country listed at [https://www.nsf.gov/od/oise/INFEWS/the_international_partnerships.jsp] s/he should request funding support, separately from this solicitation, from his/her own domestic funding agency or potentially through the US Agency for International Development's Partnerships for Enhanced Engagement in Research (PEER) program, managed by the National Academies of Science: www.nationalacademies.org/peer.

If your international collaborator does not have a source of research funds, the NSF proposal may include limited funds for services that are essential to the success of the research project, only if those services could not be provided by a US-based person or institution. "Limited" is not specifically defined, but remember that NSF is not an aid agency and your proposal will be reviewed in competition with entirely domestic proposals.

There is also anticipated to be a completely separate call for proposals on global urbanization and the food, energy, water nexus under the Belmont Forum in 2017 (https://belmontforum.org/) to which you and your international collaborators may be able to apply.

About the Submission Process

1. **This seems to be a very complicated solicitation with many required parts and pieces. Is there a checklist to ensure I have submitted all the necessary parts?**

The checklist for submission of proposals is given below and discussed in detail under "Proposal Preparation Instructions" given above.

Full INFEWS Proposal Checklist

1. Cover Sheet (see PAPPG)
2. Project summary (See PAPPG)
3. Project Description (See PAPPG – **Note change**: "Results from Prior Research" is NOT included in the 15 page limit for this solicitation).
4. References Cited (See PAPPG)
5. Biographical Sketch(es) (See PAPPG. **Please load them in the order the names appear in the Project Personnel Table**).
6. Proposal Budget (See PAPPG. Please note that all proposal MUST comply with NSF policy at the due date). Note also that Budgets submitted must include AT LEAST one person trip per year to the Washington DC. area over the lifetime of the project to represent the project at the annual INFEWS PI meeting. Budget for more than one PI meeting trip or travel by more than one project participant is allowed.
7. Current and Pending Support (for all PIs, Co-PIs, and Senior Personnel – See PAPPG)
8. Facilities, Equipment, and Other Resources (See PAPPG)
9. Supplementary Documents
   - Data Management Plan (See PAPPG)
   - Postdoctoral Researcher Mentoring Plan (if applicable – see PAPPG)
10. Other Supplementary Docs (in the order each part should appear)
    A. Project Personnel Table (addition for this solicitation)
    B. Results of Prior Research (Previously this was in the Project Description – it has been moved to this section for this solicitation only)
    C. Management Plan (addition for this solicitation)
    D. Letters of Collaboration
    E. FEW Context Statement
11. Single Copy Documents (1 separate PDF files)
    - Collaborators and Other Affiliations Matrix – (addition for this solicitation, and replaces "Collaborators and Other

Affiliations Information" Sections of the PAPPG).

2. **I see a deadline for submission is indicated in this solicitation. Does this deadline mean I can submit to any of the three tracks up until 5 pm (local time) on that date?**

   You are only able to submit proposals up to the deadline. Please note that proposals cannot be submitted after the deadline and participation of an individual is limited to a maximum of two proposals. Submitting the proposal early is strongly encouraged to ensure that you meet the deadline.

3. **Can I submit the same proposal to INFEWS and other programs or solicitations?**

   NSF prohibits PIs from submitting the same proposal to more than one program or solicitation. Please be aware that submission of duplicate or substantially similar proposals concurrently for review by more than one program without prior NSF approval will result in the return of the redundant proposals.

4. **I live in an EPSCoR jurisdiction and I noticed that there was a recent solicitation for the Research Infrastructure Improvement (RII) Track-2 Focused EPSCoR Collaborations (FEC) programs that encourages INFEWS research. Can I submit an identical proposal on this topic to EPSCoR and to INFEWS?**

   NSF prohibits PIs from submitting the same proposal to more than one program or solicitation. You will need to decide which solicitation is more aligned with your research interests and collaboration plans. Please check the EPSCoR website to determine RII Track-2 eligibility requirements.

5. **Can I obtain a waiver of the page limitation for the project description if my project is large and complex, or if my project is a large collaboration among multiple institutions?**

   No, all proposals must adhere to the page limit given in the solicitation. Note that "Results from Prior Research" has been moved to "Supplementary Documents" for this solicitation.

6. **Do all proposals require a Data Management Plan? Do all proposals require a Management Plan as well?**

   Yes, both types of plans are required in the Supplementary Documents section of all INFEWS proposals. The proposal must include a section that describes data and model sharing plans (Data Management Plan). Please note that the supplemental documents should not repeat the information in the body of the proposal, but provide concise information as defined in the NSF Grant Proposal Guide and in the Proposal Preparation Instructions section of the INFEWS solicitation. If you anticipate that your proposed project would not generate data or samples that require management and/or sharing, please state that in your Data Management Plan. Please note that this statement will be subject to merit review. In the Supplementary Documents section, the proposal must also include a Management Plan, which is also described in the Proposal Preparation Instructions section of the INFEWS solicitation. The Management Plan differs significantly from the Data Management Plan, as discussed in the solicitation. The quality and appropriateness of the Management and Integration Plan is an important review criterion for INFEWS proposals as outlined in the NSF Merit Review Criteria section of the solicitation. The proposal preparation instructions also provide information on the preparation of the "Context Statement" to also be included in "Supplementary Documents" as well as the Conflict of Interest (COI) Matrix and the Project Personnel Table (PIs, Co-PIs, senior personnel, consultants).

7. **The solicitation requires a COI Matrix of collaborators and individuals with conflicts of interest, and a spreadsheet that lists participating project personnel. These seem redundant. Why are they all necessary?**

   You are correct in noticing that there is some overlap among these lists; however, they are used for different purposes. These tables should be created as a spreadsheet and submitted as two character recognizable PDF files within "Supplementary Documents".

8. **How do we fill out the spreadsheet listing project personnel?**

   You will notice that the "List of Participating Individuals" overlaps with the COI Matrix Table. Both should be created as a spreadsheet according to the instructions provided in the solicitation and be submitted as separate pdf files within Supplementary Documents.

9. **What other resources can I read for more information regarding NSF and USDA's involvement in this initiative?**

   There is a growing body of literature on topics relevant to the INFEWS initiative. During FY2015, NSF funded a series of workshops related to food and water and energy systems. Please consult the NSF award database and other bibliographic search engines for current information.

10. **I submitted my proposal to NSF and part, or all, of my project was chosen for funding by NIFA? What will I need to do to get my award?**

For proposals selected for funding by NIFA, PIs will be asked to withdraw their proposal from NSF and resubmit it to NIFA in accordance with instructions given by the cognizant NIFA Program Officer. You will be personally contacted by this program office and provided with detailed instructions on how to resubmit your proposal to NIFA. Your proposal will not need to compete again, as it has already been reviewed through the joint NSF/NIFA INFEWS process detailed in this solicitation. NIFA requires that all proposals be submitted through Grants.gov. Project funds will be dispersed to your institution through the Automated Standard Applications for Payment Systems (ASAP), operated by the Department of Treasury's Financial Management Service. For more information see http://www.nifa.usda.gov/business/method_of_payment.html.

Post award management will be done jointly with NSF. All PI meetings will be held jointly by NSF and NIFA. All projects funded by NIFA will need to submit their project reports through the NIFA reporting system. When projects are jointly funded through NSF and NIFA, they should submit a unified annual report that is a summary of the outcomes, impacts, and progress of the entire project. Reports should be drafted by the team, but will need to be submitted to both NSF and NIFA to meet the federal grant reporting standards of each agency. A similar report can be submitted to the reporting systems of both agencies to present a unified annual report.

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23