FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy
National Energy Technology Laboratory

Synchrophasor Applications and Tools for Reliability and Asset Management

Funding Opportunity Number: DE-FOA-0001492

Announcement Type: Initial

CFDA Number: 81.122 Electricity Delivery and Energy Reliability, Research, Development and Analysis

Issue Date: 03/22/2016
Letter of Intent Due Date: Not Applicable
Pre-Application Due Date: Not Applicable
Application Due Date: 06/30/2016 at 8:00:00 PM Eastern Time
NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this Announcement (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the System for Award Management (SAM), and register with Grants.gov). Applicants, who are not registered with SAM and Grants.gov, should allow at least 44 days to complete these requirements. It is suggested that the process be started as soon as possible.


Applicants must register with the SAM. SAM website: http://www.sam.gov/. If you had an active registration in CCR, you should have an active registration in SAM. More information about SAM registration for applicants is found at: https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations_v1.7.pdf.

Applicants must register with Grants.gov. There are 3 steps to this process.
1) The Authorized Organizational Representative (AOR) must register at: https://apply07.grants.gov/apply/OrcRegister.
2) An email is sent to the E-Business (E-Biz) POC listed in SAM. The E-Biz POC must approve the AOR registration using their MPIN from their SAM registration.
3) AOR verifies that registration was completed at: http://grants.gov/applicants/applicant_profile.jsp.

More information about the above steps is provided at: http://www.grants.gov/applicants/organization_registration.jsp.

Applicants must register with FedConnect to submit questions. FedConnect website: www.fedconnect.net.

Questions

Questions relating to the registration process, system requirements, or how an application form works must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.
Application Preparation and Submission

(Additional instructions are provided in Section IV A of this FOA.)

Where to Submit
Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your SAM registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS:  When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).
Section I - FUNDING OPPORTUNITY DESCRIPTION

A. SUMMARY

Prior research investments by DOE in the early 2000’s on synchrophasor technologies received a major boost of federal funding through the American Recovery and Reinvestment Act of 2009. This enabled deployment of synchrophasor technologies and monitoring systems across the US. Today, thousands of phasor measurement unit (PMU) signals are being streamed continuously to grid operators. Moreover, the number is increasing as transmission owners, now joined by the generation and distribution systems, continue to make investments in this revolutionary new monitoring technology.

The Department of Energy (DOE), National Energy Technology Laboratory (NETL), on behalf of the Office of Electricity Delivery and Energy Reliability (OE), is issuing this Funding Opportunity Announcement (FOA) to advance two classes of synchrophasor software applications and tools: Reliability Management and Asset Management. Work proposed must include field demonstration at a host site used as a transitional step toward full commercialization. Work is also permitted that supports aspects of the synchrophasor software applications including, but not limited to, data quality management processes and offline training simulators involving the advanced synchrophasor software applications.

B. BACKGROUND INFORMATION

Reliability management of the electric power system is based on concepts developed several decades ago that relied upon what was then the best-available monitoring, computation, and communication technologies. The approach involved pre-positioning online reserve margins that respond automatically to unforeseen contingencies, such as the loss of a large generator or major transmission line. Typically, the majority of generation was located close to the point of delivery or load. Inter-connections with neighboring systems were relied upon for bilateral economic exchanges and reliability backup, but only at the margins. Moreover, generation was coupled synchronously both to other generators and to loads.

Historically, reliability management involved a coordinated set of monitoring and redispatch actions to ensure maintenance of operating reserve margins. Monitoring technologies involved snap-shots of selected grid conditions taken at four to 10 second intervals, which were communicated to central control centers. However, these measurements were subject to calibration errors and unavailability. The measurements, along with topological information on outaged elements, were combined to estimate the “state” of the power system. The robustness of the power system was then investigated by subjecting the resulting power system model to a list of credible contingencies. If the analysis revealed violations of reliability performance criteria, generation was redispatched to ensure that if these contingencies arose, the system could be managed safely with newly re-set operating margins.

The assumptions upon which this approach to reliability management rely have been challenged by fundamental changes in how the power system is operated today, the much longer times involved in building new transmission, and more recently, slow turnover in the fleet of generation.

In 1996, Federal Energy Regulatory Commission (FERC) Orders 888 and 889 modified the transmission system from one designed to serve the individual needs of vertically integrated utilities, to one operated as a common carrier serving the needs of a competitive market for trade among generators and load serving entities. As a result, power now flows over the transmission system based on region- and interconnection-wide opportunities for economic trade. This has increased reliance on power generated by, and imported by and through, neighboring power systems, greatly increasing the volumes of electricity flowing through the transmission system. The planning and business framework for transmission investment is still evolving. There is increased local resistance to new transmission, and construction times are lengthy. Lack of new transmission further exacerbates demands placed on ever-greater utilization of existing transmission lines.
Public policies and commercial trends have also started changing the composition of the fleet of generation and behavior of loads consuming electricity. Renewable generation, in addition to its variable output, contributes no inertia to the power system. Baseload generation from coal and nuclear, which have been the traditional sources of inertia, are retiring. Growing power electronic interfaces for many loads mean both loss of contribution to inertia and grid-unfriendly behaviors precisely at times of system need (e.g., constant power inverters draw more current when voltages are depressed further, increasing requirements on generators responding to contingencies).

Most of the current synchrophasor software applications and tools, hereafter referred to as software applications, are offline and focus on reliability management by transmission system operating engineers. They include post-event forensic analysis, validation of transmission planning model analysis, enhanced state estimation, and calibration of transmission planning model inputs such as generator models. Existing online software applications are focused primarily on monitoring frequency, voltage, and power flows including oscillatory phenomena. Commercial software exists for these monitoring functions. However, real-time control software applications using synchrophasor data have not yet been deployed in operations; advances are still needed in monitoring, detection, evaluation, and remediation procedures.

Reliance on these reliability management software applications is not widespread, and adoption has been hampered by data quality issues. New software applications are not being deployed because data quality is not adequate to support production-grade installation. Yet, motivation to improve data quality is driven by the value of the software applications they support, which cannot be demonstrated until data quality improves. Entities leading the synchrophasor software application deployment do not own, and thus do not maintain, the underlying monitoring technologies. These technologies are owned by transmission asset owners, who are not direct recipients of the technology’s reliability benefits.

Recently, research has pointed to a need for software applications that address asset management. Transmission owners are discovering they can use synchrophasor data to gain unprecedented visibility into the status and health of equipment monitored by PMUs. Development of such asset management software applications would provide direct economic value to transmission asset owners, further encourage deployment of the monitoring technology, and ensure that the data produced will be continuously available and of high quality. Presently there is no systematic body of research dedicated to identifying, testing, and demonstrating software applications for asset management.

Applicants may go to http://energy.gov/oe and www.smartgrid.gov for additional information on DOE’s programs and projects under OE. The results of the collaborations awarded by this FOA will complement previous and ongoing work in the field of synchrophasor technologies.

C. FUNDING OPPORTUNITY DESCRIPTION

DOE is looking to support the industry’s transition to technologies led by time-synchronized, high-speed measurements, which from this point forward will be referenced as synchrophasor technologies. Synchrophasors will affect the evolution of the US grid by improving system reliability, increasing the utilization of existing transmission assets, and improving the efficiency of wholesale market operations. The high-speed, precisely time-stamped measurements that synchrophasors collect, communicate, and analyze will greatly enhance existing grid operations and enable new operating procedures. These advances will help to address the key grid operating and planning challenges. Within this FOA, synchrophasors will include the following: individual smart grid monitoring, communication, analysis, and control technology elements, taken together and integrated into a system including PMUs; other devices with PMU-like capabilities; phasor data concentrators (PDCs), communications networks of varying technologies and speeds used to move synchrophasor data; and software applications that use synchrophasor data.

The purpose of this FOA is to advance two classes of software applications that rely on synchrophasor data: Reliability Management and Asset Management. All proposed projects must include field demonstration at a host site used as a transitional step toward full commercialization. Projects may also include activities that support aspects of the software applications including, but not limited to, data quality management
processes and offline training simulators involving the advanced software applications.

Applicants may propose to field demonstrate Reliability Management software applications that may include, but are not limited to: detection and assessment of power system oscillations, frequency response monitoring and assessment, power system restoration, model validation and calibration, and state estimation.

Applicants may propose to field demonstrate Asset Management software applications that may provide insight into incidents with hydro and fossil generators, oscillations caused by wind plants, and various transmission equipment issues. It is anticipated that such software applications may provide proactive ways to use synchrophasor data and creative analytical techniques to detect and protect equipment before it fails, thereby supporting asset maintenance and protection, improving grid reliability, and/or resulting in operational savings.

At a minimum, an Applicant’s project team must include one utility/transmission owner/transmission operator host for the field demonstration and one software vendor/developer. Applicants may include additional field demonstration hosts and software vendors/developers, as well as other team members, as desired. Each team member (excluding the primary Applicant) shall provide evidence of commitment from an official of that member’s organization indicating its willingness to participate in the project. **Failure to include at least one utility/transmission owner/transmission operator field demonstration host and at least one software vendor/developer in the application, or failure to provide all required commitment letters as outlined in Section IV.C.2. of this FOA shall result in the application being deemed non-responsive. Non-responsive applications will not be forwarded for comprehensive merit review.**

While an Applicant should propose what he/she believes will accomplish the objectives of this announcement, DOE offers the following as some examples of concepts that could represent a portion of the proposed scope:

- Developing and implementing a deployment model/agreement with strong, ideally long-term, commitments from both the utility/transmission owner/transmission operator and software vendor/developer.
- Collaborating between the utility/transmission owner/transmission operator and software vendor/developer, including such activities as developing IT support requirements and procedures, operating guides based on utilization of the software applications, and staff training materials on the use of the software application.
- Establishing procedures to enable the software tool’s first-of-its-kind field demonstration through integration of the tool into utility/transmission owner/transmission operator existing operations; e.g., interface with the utility’s/transmission owner’s/transmission operator’s SCADA and related Energy Management System (EMS) software applications.
- Moving a small-scale demonstration of the software application into a wide demonstration area, targeting additional diverse utilities/transmission owners/transmission operators or different interconnections.
- Developing a business plan for continued demonstration and/or expansion of demonstration territory and customer base.
- Addressing reliability management and renewable integration to improve distribution system operations as a driver for deployment of the technology within distribution systems.

Suitable applications are not limited to the above examples. Similarly, DOE offers the following as some examples of concepts that would **not** be well suited to this announcement:

- Deploying a software application that would not be viable or valuable for future deployment beyond that planned in response to this announcement.
- Utilizing funds from this announcement to purchase new equipment or pay for utility/transmission owner/transmission operator operations.
- Solely subsidizing software tool installation.
Section II - AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding grants under this funding opportunity announcement.

B. ESTIMATED FUNDING

Approximately $5,000,000 of federal funding is expected to be available for new awards under this announcement. Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

C. MAXIMUM AND MINIMUM AWARD SIZE

Estimated DOE share ceiling (i.e., the maximum DOE share for an individual award made under this announcement): $2,000,000

Estimated DOE share floor (i.e., the minimum DOE share for an individual award made under this announcement): $500,000

D. EXPECTED NUMBER OF AWARDS

DOE anticipates making approximately two (2) to four (4) awards under this announcement.

E. ANTICIPATED AWARD SIZE

The maximum DOE funding for individual awards is estimated to be $2,000,000. The Applicant will be required to cost share a minimum of 50% of the total project costs.

Total project costs = DOE share + Applicant cost share.

*Note: The Applicant may contribute more than the 50% cost share requirement.

F. PERIOD OF PERFORMANCE

DOE anticipates making awards that have a single Budget Period and do not exceed two (2) years.

G. TYPE OF APPLICATION

DOE will accept only new applications under this announcement.
Section III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

1. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient or subrecipient.

2. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as a prime recipient or subrecipient.

State, local, and tribal government entities are eligible to apply for funding as a prime recipient or subrecipient.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) and DOE Government-Operated Government-Owned laboratories (GOGOs) are not eligible to apply for funding as a prime recipient or subrecipient.

Non-DOE/NNSA FFRDCs and non-DOE GOGOs are not eligible to apply for funding as a prime recipient or subrecipient.

Federal agencies and instrumentalities (including DOE) are not eligible to apply for funding as a prime recipient or subrecipient.

3. Foreign Entities

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this FOA.

Other than as provided in the "Individuals" or "Domestic Entities" sections above, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate. Foreign entities may request a waiver of this requirement in the Full Application. See Section VIII for waiver request information. The DOE Contracting Officer has discretion to waive this requirement if he/she determines that it will further the purposes of this FOA and is otherwise in the interests of OE.

A foreign entity may receive funding as a subrecipient.

4. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a prime recipient or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the DOE Contracting Officer.
5. **Unincorporated Consortia**

Unincorporated consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative. The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the prime recipient/consortium representative under Section III.A of the FOA.

Upon request, unincorporated consortia must provide the DOE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together that should discuss, among other things, the consortiums’:

* Management structure;
* Method of making payments to consortium members;
* Means of ensuring and overseeing members’ efforts on the project;
* Provisions for members' cost sharing contributions; and
* Provisions for ownership and rights in intellectual property developed previously or under the agreement.

**B. COST SHARING**

The cost share must be at least 50% of the total allowable costs for demonstration and commercial application projects (i.e., the sum of the Government share and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation] for the applicable cost sharing requirements.)
A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "APPLICANT", then Click “Apply for Grants," and then select "Download a Grant Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent.

Letters of Intent are not required.

2. Pre-application

Pre-applications are not required.

C. CONTENT AND APPLICATION FORMS

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Certifications and Assurances.

2. RESEARCH AND RELATED Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 7 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public after awards are made. The project summary must not exceed 2 pages when printed using standard 8.5 inch by 11 inch paper with 1 inch margins (top, bottom, left and right) single spaced with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

Project Narrative (Field 8 on the Form)

The project narrative must not exceed 20 pages, including cover page, table of contents, charts, graphs, maps, photographs, tables, and other pictorial presentations, when printed using standard 8.5 inch by 11 inch paper with 1 inch margins (top, bottom, left and right) single spaced with font not smaller than 11
The project narrative must include:

[****BEGIN PROJECT NARRATIVE FORMAT****]

- Project Objectives: This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

- Merit Review Criterion Discussion: The section should be formatted to address each of the merit review criterion and sub-criterion listed in Part V.A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.

- Relevance and Outcomes/Impacts: This section should explain the relevance of the effort to the objectives in the program announcement and the expected outcomes and/or impacts.

- Roles of Participants: Describe the roles and the work to be performed by each participant/investigator, business agreements between the applicant and participants, and how the various efforts will be integrated and managed.

- Multiple Principal Investigators: The applicant, whether a single organization or team/partnership/consortium, must indicate if the project will include multiple Principal Investigators (PIs). This decision is solely the responsibility of the applicant. If multiple PIs will be designated, the application must identify the Contact PI/Project Coordinator and provide a "Coordination and Management Plan" that describes the organization structure of the project as it pertains to the designation of multiple PIs. This plan should, at a minimum, include:
  - process for making decisions on scientific/technical direction;
  - publications;
  - intellectual property issues;
  - communication plans;
  - procedures for resolving conflicts; and
  - PIs' roles and administrative, technical, and scientific responsibilities for the project.

- Facilities and Other Resources: Identify the facilities (e.g., office, laboratory, computer, etc.) to be used at each performance site listed and, if appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Provide any information describing the other resources available to the project such as machine and electronics shops.

- Equipment: List important items of equipment already available for this project and, if appropriate, note the location and pertinent capabilities of each. If you are proposing to acquire equipment, describe comparable equipment, if any, already at your organization and explain why it cannot be used.

- Bibliography and References, If Applicable: Provide a bibliography for any references cited in the Project Narrative section. This section must include only bibliographic citations.

- Statement of Project Objectives (SOPO): The project narrative must contain a single, detailed SOPO that addresses how the project objectives will be met. The SOPO must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The SOPO may be released to the public by DOE in whole or in part after award. It is therefore
required that it shall not contain proprietary or confidential business information. The SOPO is generally less than 5 pages in total for the proposed work. The SOPO is a part of the Project Narrative and must be included within the 20-page Project Narrative page limit. Applicants shall prepare the SOPO in the following format:

****BEGINNING OF DRAFT FORMAT FOR SOPO****

(Note: Items following “Note:” are intended to provide guidance regarding the contents to be provided. Please delete all notes before submission.)

STATEMENT OF PROJECT OBJECTIVES (SOPO)

(Note: State name of project)

(Note: State Assistance Agreement number or leave blank if a proposal)

A. Objectives

(Note: Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.)

B. Scope of Project

(Note: This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.)

C. Tasks and Subtasks to be performed

(Note: Concisely written task summaries should be provided in a logical sequence and should be divided into the phases of the project, as appropriate. This section should provide a brief summary of the planned work to accomplish this project.)

(Note: The following is a required FOA-specific activity to be included within the Tasks and Subtasks to be performed:

- Completion of field demonstration

The following are strongly recommended FOA-specific activities to be included within the Tasks and Subtasks to be performed:

- Preparation of functional specification
- Preparation of field demonstration plan
- Completion of factory acceptance testing
- Completion of field acceptance testing
- Publication and presentation of results/progress)

PHASE I

Task 1.0 – Project Management and Planning

(Note: Description includes work elements required to revise and maintain the Project Management Plan (PMP) and to manage and report on activities in accordance with the PMP and
the Reporting Requirement of the Agreement. An outline of the PMP (a separate requirement to be submitted with your application) is provided later.)

The Recipient will update the Project Management Plan (PMP) to reflect how the project will be managed. The PMP will follow the template provided by DOE.

The Recipient will not proceed beyond this point until the updated PMP has been submitted to the DOE Technical Project Officer.

Subtask 1.1 – (Note: Include if applicable. State Subtask title)

(Note: Provide a Subtask description)

Task 2.0 – (Note: State Task title)

(Note: Provide a description and, if applicable, add Subtasks)

Task 3.0 – (Note: State Task title)

(Note: Provide a description and, if applicable, add Subtasks)

(Note: DOE acknowledges that a well-structured project should have Go/No Go decision points that coincide with project phases. DOE encourages the Applicant to insert decision points into the draft SOPO as appropriate; however, during negotiations DOE will make the final decision whether or not to include Go/No Go decision points in the final SOPO. If Go/No Go decision points are planned, the following language will be included in Section C of the SOPO for each Go/No Go decision point:

TECHNICAL GO/NO GO DECISION POINT 1

The Recipient shall meet the following success criteria:

• (Note: Define the criteria required to justify moving through the decision point and onto the next task.)

The Recipient will provide DOE the data needed to justify proceeding based upon the success criteria outlined above. The Recipient is NOT authorized to proceed beyond this task without the written approval of DOE. If the Recipient unilaterally decides to continue into the subsequent tasks prior to DOE approval, all costs incurred are at the Recipient’s risk and no DOE funds may be utilized for reimbursement of such costs.)

PHASE II (Note: Include if applicable)

Task 4.0 – (Note: State Task title)

(Note: Provide a description and, if applicable, add Subtasks)

D. Technical Deliverables

(Note: If applicable, identify additional technical deliverables – those beyond the standard deliverables identified in the "Federal Assistance Reporting Checklist" from the Assistance Agreement. These additional technical deliverables will be referred to as “SOPO deliverables.” The SOPO deliverables should also be referenced in SOPO Section C above within the associated Task/Subtask description.)
Applicants must include the following required SOPO deliverables specific to this FOA:

- Publications related to this award, including indication if publication was peer-reviewed; and
- Presentations given to external audiences related to this award, including indication if presentation was peer-reviewed.

The SOPO deliverable number is associated with the Task or Subtask. For example, Deliverable 2.1.1 would represent the first deliverable associated with Subtask 2.1. Deliverable 3.0.2 would represent the second deliverable associated with Task 3.0. The first SOPO deliverable is the submission of an accurate, up-to-date PMP, including any negotiated/revised project requirements; e.g., tasks, schedule, budget, milestones, etc.; which will replace the original PMP submitted with the application.

All periodic, topical, and final reports will be submitted in accordance with the attached “Federal Assistance Reporting Checklist” and the instructions accompanying the checklist. In addition to the periodic and final reports specified in the Federal Assistance Reporting Checklist, the Recipient will submit the following reports to DOE within 30 calendar days of completion of the respective Task or Subtask, or as specified:

PHASE I

1.0.1. Revised Project Management Plan  
(Note: Provide a description of the deliverable and specific due date, if it is not appropriate to submit the deliverable within 30 calendar days of completion of associated Task or Subtask.)

(X.X.X) (Deliverable Title)  
(Note: Provide a description of the deliverable and specific due date, if it is not appropriate to submit the deliverable within 30 calendar days of completion of associated Task or Subtask.)

(X.X.X) (Deliverable Title)  
(Note: Provide a description of the deliverable and specific due date, if it is not appropriate to submit the deliverable within 30 calendar days of completion of associated Task or Subtask.)

PHASE II (Note: Include Phase II, if applicable)

(X.X.X) (Deliverable Title)  
(Note: Provide a description of the deliverable and specific due date, if it is not appropriate to submit the deliverable within 30 calendar days of completion of associated Task or Subtask.)

E. Briefings/Technical Presentations

The Recipient will prepare detailed briefings for presentation to DOE Headquarters Staff and the DOE/NETL Project Officer. Briefings will be given by the Recipient to explain the plans, progress, and results of the technical effort. The first briefing will be included in the Award kick-off meeting, which is typically to be presented within 30 calendar days of the effective date of the Award. This kick-off meeting will be in person at a mutually agreed upon location, or by remote conferencing (teleconference or videoconference). Additional briefings will be required for program reviews and/or annual site visits/inspections. A final briefing will be presented at least 30 calendar days prior to expiration of the Award.

The Recipient will provide and present technical paper(s) and/or presentation(s) at the North American SynchroPhasor Initiative (NASPI) meetings, as requested by DOE.
Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers Appendix:

Provide the following information in this section. This appendix will **not** count in the project narrative page limitation:

Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state "None."

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last 5 years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates.

OTHER ATTACHMENTS (FIELD 12 ON THE FORM)

If you need to elaborate on your responses to questions 1-6 on the "Other Project Information" document, attach a file in Field 12.

Also, attach the following files:

**Project Management Plan**

Applicants shall prepare the Project Management Plan (PMP) in the following format:

***BEGINNING OF DRAFT FORMAT FOR PMP***

(Note: Every Applicant must provide a PMP as part of the application. The first required SOPO deliverable is a revised PMP that is up-to-date including any negotiated/revised project requirements; e.g., tasks, schedule, budget, milestones, etc.; which will replace the original PMP submitted with the application. The PMP will also be updated by the Recipient as the project progresses. The Recipient must use the current PMP to report schedule and budget variances. Recipients will reference their Assistance Agreement Terms and Conditions for required acknowledgement and disclaimer to be included in all materials produced in association with the Assistance Agreement.)

**PROJECT MANAGEMENT PLAN**

*{Title of Project}*

*{Date Prepared}*

**WORK PERFORMED UNDER AGREEMENT**

*{Assistance Agreement Number}*

**SUBMITTED BY**

*{Recipient Business Contact}*

*{Organization Name}*

*{Organization Address}*

*{City, State, Zip Code}***
1. EXECUTIVE SUMMARY and TECHNICAL APPROACH

(Note: Provide a description of the project that includes the objective, project goals, and expected results. Summarize the technical approach used to accomplish project objectives.)

2. KEY PERSONNEL

(Note: List the Recipient’s key personnel, their role, and contact information. Key personnel include the Principal Investigator (PI), Business Point of Contact, and any other personnel or contractors that will play a significant role in the execution of the project. The Recipient is required to note any changes to key personnel in the required progress reports, and certain changes to key personnel may require DOE Contracting Officer’s approval.)

3. FUNDING AND COSTING PROFILE

(Note: This section requires three separate tables. First, provide a Project Funding Profile table that shows the amount of government funding going to each project team member. An example of the format for the Project Funding Profile table is provided below.)

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Government Funding to be Received</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Total Government Funds</td>
<td>$</td>
</tr>
</tbody>
</table>

(Note: Second, provide a Budget Table (consistent with the approved budget in the Assistance Agreement for successful Applicants) showing each budget category (e.g., personnel, fringe, travel, equipment, etc.) to sufficient detail to enable the PI to manage the budget and the DOE Project Officer to monitor the execution of the budget. Substantial contracts or subawards (e.g., greater than $100,000 or otherwise agreed upon by the DOE Project Officer and the PI) may require separate Budget Tables. An example the format for the Budget Table is provided below.)
Table 2. Budget Table

<table>
<thead>
<tr>
<th>Budget Category</th>
<th>Government Share</th>
<th>Cost Share</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Fringe Benefits</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Travel</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Equipment</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Supplies</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Contractual (list separately any contracts over $100k)</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Other</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Sub-Total Direct Charges</strong></td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Indirect Charges</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

(Note: Third, provide a Monthly Spending Plan table that projects, by month, the expenditure of the government funds. An example of the format for the Monthly Spending Plan is provided below. If the Assistant Agreement includes more than one budget period, a separate Monthly Spending Plan table will be required for each budget period.)

Table 3. Monthly Spending Plan

<table>
<thead>
<tr>
<th>Month</th>
<th>Government Funds to be Expended</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Note: State first month and year of project. Each row should represent the subsequent month. Add rows as needed.)</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>$</td>
</tr>
<tr>
<td>(Note: State final month and year of project.)</td>
<td>$</td>
</tr>
<tr>
<td>Total Government Funds</td>
<td>$</td>
</tr>
</tbody>
</table>

4. MILESTONE LOG

(Note: Identify major milestones used to measure project success. A milestone 1) may be a significant project event, 2) may be the end or beginning of a stage of work, 3) has no associated time duration, 4) expends no resources, and 5) is used to gauge overall progress of the project. Milestones are specific, measurable, achievable, relevant, and timely. A milestone is not simply a deliverable. A deliverable is either one required by the Federal Assistance Reporting Checklist or a SOPO deliverable. Each milestone will include a title, description, planned completion date, and a description of the method/process/measure used to verify its completion. The milestones identified must be verifiable and show progression towards project goals. Ideally, a minimum of two milestones should be planned for each year of the project. Milestones should be recorded in chronological order in the Milestone Log. During project performance, the Recipient will report Milestone Status as part of the required project reports as prescribed in the Federal Assistance Reporting Checklist. The Milestone Log should be modified in the progress report to include an actual completion date column and a notes column in which the Recipient can explain changes in planned completion dates or rationale for milestone delays. This information may be used for DOE to demonstrate program success. There is one (1) required and four (4) strongly recommended FOA-specific milestones to be included by all.)
Applicants. They are shown in the example of the format for the Milestone Log provided below.

Table 4. Milestone Log

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Description</th>
<th>Planned Completion Date</th>
<th>Verification Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Note: Include “Acceptance of functional specification (or equivalent) for software application by utility demonstration host,” if applicable.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Note: Include “Acceptance of field demonstration test plan by utility demonstration host and by NETL technical advisory body,” if applicable.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Note: Include “Completion of factory acceptance testing by developer with oversight by utility demonstration host,” if applicable.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Note: Include “Completion of field acceptance testing by developer working with utility demonstration host,” if applicable.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion of field demonstration at utility demonstration host</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Note: Place the required milestone, listed above, among the other identified milestones in chronological order. Add rows as needed.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. PROJECT SCHEDULE

(Note: Provide a schedule of the project (similar to a Gantt chart) broken down by each Task and Subtask, as described in the SOPO. For each Task and Subtask, the schedule will include a start date, end date, team members participating in that Task/Subtask, and team member role. The schedule will show any interdependencies with other Tasks/Subtasks and include all milestones identified in the Milestone Log. The Project Schedule may be in the form of a table or a Gantt chart. An example of the format of the Project Schedule as a table is provided below.)

Table 5. Project Schedule

<table>
<thead>
<tr>
<th>Tasks, Subtasks, and Milestones</th>
<th>Start Date</th>
<th>End Date</th>
<th>Interdependencies</th>
<th>Verification Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>
Depending upon the size and complexity of the project, a resource-loaded schedule might be appropriate. A resource-loaded schedule would show major Tasks/activities with associated costs. This could be incorporated into the project schedule, or shown as a separate table. The need for a resource-loaded schedule should be discussed with the Recipient and agreed upon by the DOE Project Officer and PI.

Provide a Project Deliverables Log that lists both the required SOPO deliverables and deliverables noted on the Federal Assistance Reporting Checklist along with their planned completion dates. An example of the format for the Project Deliverables Log is provided below.

Table 6. Project Deliverables Log

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Completion Date</th>
<th>Submission Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Note: Deliverable titles listed here should match the titles included in the SOPO and Federal Assistance Reporting Checklist.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. **RISK MANAGEMENT**

Provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. Risk is inherent to all projects, regardless of the level of complexity, cost or visibility, thus project risk must be addressed to the appropriate level for every project. Provide a Risk Management Log that includes all known significant technical, resource, and management risks that have the potential to impede project progress. For each risk, provide a description of the potential impact to the project should the risk materialize. Also, include the mitigation method describing the approach to minimize the impacts of the risk. An example of the format for the Risk Management Log is provided below.

Table 7. Risk Management Log

<table>
<thead>
<tr>
<th>Risk</th>
<th>Impact</th>
<th>Mitigation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. **SUCCESS CRITERIA AT GO/NO GO DECISION POINTS**

Provide the success criteria for each Go/No Go decision point included in the SOPO, if applicable. The success criteria should be objective and stated in terms of specific, measurable, and repeatable data. Usually, the success criteria pertain to desirable outcomes, results, and observations from the project.
8. STATEMENT OF PROJECT OBJECTIVES

(Note: For FOA applications, this section of the PMP should be omitted. Recipients will copy and paste the final negotiated SOPO from the Assistance Agreement into this section.)

****END OF DRAFT FORMAT FOR PMP****

Save the PMP in a single file named "pmp.pdf" and click on "Add Attachments" in Field 12 to attach.

Data Management Plan (SEPT 2015)

Applicants are required to submit a Data Management Plan as part of their full application. The Data Management Plan is a document that outlines the proposed plan for data sharing or preservation. Submission of this plan is required with the full application, and failure to submit the plan may result in rejection of the applicant’s application without further consideration. Guidance for preparing a Data Management Plan is provided in Appendix IX of the FOA. Click on "Add Attachments" in Field 12 to attach.

Commitment Letters from Third Parties Contributing to Cost Sharing

If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of the required cost sharing, the applicant must include a letter from the third party stating that it is committed to providing a specific minimum dollar amount of cost sharing. The letter should also identify the proposed cost sharing (e.g., cash, services, and/or property) to be contributed. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided as a PDF. Save this information in a single file named "CLTP.pdf" and click on "Add Attachments" in Field 12 to attach.

Industry Collaboration/Participation Letter

Eligible applicants shall provide an Industry Participation Letter ensuring collaboration between utilities/transmission owners/transmission operators, software vendor/developers, and other project team members pursuant to the mandatory requirements outlined in Part I of this FOA. Letters must be signed by the person authorized to commit the industry partner to participation in the project and be provided as a PDF. Save this in a single file named “Industry Collaboration.pdf” and click on “Add Attachments” in Field 12 to attach.

Environmental Questionnaire

You must complete an environmental questionnaire for each geographic site where project activities will take place for the project by the applicant and for all team member locations. The form is located at http://www.netl.doe.gov/File%20Library/Business/forms/451_1-1-3.pdf. Save the questionnaire in a single file named "Env.pdf" and click on "Add Attachments" in Field 12 to attach.

3. RESEARCH AND RELATED SENIOR/KEY PERSON

Complete this form before the Budget form to populate data on the Budget form. Beginning with the Project Director/Principal Investigator(s) (PD/PI), provide a profile for each senior/key person proposed. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project, whether or not a salary is proposed for this individual. Subrecipients and consultants must be included if they meet this definition. For each senior/key person provide:

Biographical Sketch. Complete a biographical sketch for each senior/key person and attach to the "Attach
Biographical Sketch* field in each profile. The biographical information for each person must not exceed 2 pages when printed on 8.5 inch by 11 inch paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience. Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

Current and Pending Support. Provide a list of all current and pending support (both Federal and non-Federal) for the PD/PI and senior/key persons, including subrecipients, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review. Save the information in a separate file and attach to the "Attach Current and Pending Support" field in each profile.

4. **RESEARCH AND RELATED BUDGET (TOTAL FED + NON-FED)**

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See Section IV.G).

**Budget Justification (Field K on the form)**

Provide the required supporting information for the following costs (See R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

Applicants shall use the Detailed Budget Justification form (OMB Number 1910-5162) attached to this FOA. Save the information in a single file named “RecipientBudgetJustification.xls or .xlsx” and click on “Add Attachments” in Field K to attach.

5. **R&R SUBAWARD (TOTAL FED + NON-FED) FORM**

Budgets for Subrecipients, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subrecipient that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET (Total Fed + Non-Fed) FORM and e-mail it to each subrecipient that is
required to submit a separate budget. In addition, send each subrecipient the Detailed Budget Justification form (OMB Number 1910-5162) attached to this FOA. After the Subrecipient has e-mailed its completed budget and budget justification back to you, click on “Add Attachment” in Field 12 to attach both forms. Use up to 10 letters of the subrecipient's name as the file name followed by “SubawardBudget.pdf” (for the subrecipient budget) and “SubawardBudgetJustification.xls or .xlsx” (for the subrecipient budget justification).

6. PROJECT/PERFORMANCE SITE LOCATION(S)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

7. DISCLOSURE OF LOBBYING ACTIVITIES (SF-LLL)

If applicable, complete SF-LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

Summary of Required Forms and Files

Your application must include the following documents:

<table>
<thead>
<tr>
<th>Name of Document</th>
<th>Format</th>
<th>Attach to</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF 424 (R&amp;R)</td>
<td>Form</td>
<td>N/A</td>
</tr>
<tr>
<td>RESEARCH AND RELATED Other Project Information</td>
<td>Form</td>
<td>N/A</td>
</tr>
<tr>
<td>Project Summary/Abstract</td>
<td>PDF</td>
<td>Field 7</td>
</tr>
<tr>
<td>Project Narrative, including required appendix</td>
<td>PDF</td>
<td>Field 8</td>
</tr>
<tr>
<td>Project Management Plan</td>
<td>PDF</td>
<td>Field 12</td>
</tr>
<tr>
<td>Data Management Plan</td>
<td>PDF</td>
<td>Field 12</td>
</tr>
<tr>
<td>Commitment Letters from Third Parties</td>
<td>PDF</td>
<td>Field 12</td>
</tr>
<tr>
<td>Industry Collaboration/Participation Letter</td>
<td>PDF</td>
<td>Field 12</td>
</tr>
<tr>
<td>Environmental Questionnaire(s)</td>
<td>PDF</td>
<td>Field 12</td>
</tr>
<tr>
<td>RESEARCH &amp; RELATED SENIOR/KEY PERSON Profile (Expanded)</td>
<td>Form</td>
<td>N/A</td>
</tr>
<tr>
<td>Biographical Sketch</td>
<td>PDF</td>
<td>Attach to appropriate block</td>
</tr>
<tr>
<td>Current and Pending Support</td>
<td>PDF</td>
<td>Attach to appropriate block</td>
</tr>
<tr>
<td>RESEARCH AND RELATED BUDGET (Total Fed + Non-Fed)</td>
<td>Form</td>
<td>N/A</td>
</tr>
<tr>
<td>Budget Justification</td>
<td>Excel</td>
<td>Field K</td>
</tr>
<tr>
<td>R&amp;R SUBAWARD BUDGET (Total Fed + Non-Fed) ATTACHMENT(S) FORM, if applicable</td>
<td>Form</td>
<td>N/A</td>
</tr>
<tr>
<td>Budget Justification, if applicable</td>
<td>Excel</td>
<td>Field 12</td>
</tr>
<tr>
<td>PROJECT/PERFORMANCE SITE LOCATION(S)</td>
<td>Form</td>
<td>N/A</td>
</tr>
</tbody>
</table>
D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE/NNSA reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications are not required.

2. Application Due Date

Applications should be received by June 30, 2016 not later than 8:00 PM Eastern Time. You are encouraged to transmit your application well before the deadline. It is strongly recommended that application submission begin well in advance (at least 48 hours) of the FOA closing. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

F. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372 - Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS (December 2014)

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

Cost Principles. Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]. The cost principles for commercial organization are in FAR Part 31.

Pre-award Costs. Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit
APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD.

Submit electronic applications through the "Apply for Grants" function at [www.Grants.gov](http://www.Grants.gov). If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. **Registration Process**

**One Time Registration Process**

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See [http://www.grants.gov/applicants/get_registered.jsp](http://www.grants.gov/applicants/get_registered.jsp)). We recommend that you start this process at least six weeks before the application due date. It may take 44 days or more to complete the entire process. See the Grants.gov web page for Registering as an Organization at [http://www.grants.gov/web/grants/applicants/organization-registration.html](http://www.grants.gov/web/grants/applicants/organization-registration.html) to guide you through the process. **[IMPORTANT: During the SAM registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner Identification Number" (MPIN). The EBIZ POC will need the MPIN to complete the Grants.gov registration process.]** When you have completed the Grants.gov registration process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step.

3. **Application Receipt Notices**

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

- Number 1 - Grants.gov Submission Receipt Number
- Number 2 - Grants.gov Submission Validation Receipt for Application Number
- Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
- Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number
Section V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the funding opportunity announcement has been submitted; and (3) the proposed project is responsive to the objectives of the funding opportunity announcement. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

In addition to the initial review criteria outlined above, if a written application fails to meet the following mandatory requirements as outlined in PART I – Funding Opportunity Description, the application will not be forwarded for comprehensive merit review and the application will be eliminated from further consideration.

Mandatory Technical Requirements

Failure to include at least one utility/transmission owner/transmission operator and at least one software vendor/developer in the application as outlined in Section I.C, or failure to provide all required commitment letters as outlined in Section IV.C.2 of this announcement shall result in the application being deemed non-responsive to this announcement. Non-responsive applications will not be forwarded for comprehensive merit review.

2. Merit Review Criteria

The following evaluation criteria will be used to evaluate applications received under this Funding Opportunity Announcement:

Criterion 1:
TECHNICAL MERIT (30%)
- Degree of innovation of software application;
- Robustness of the Applicant’s proposed approach to address asset management or reliability management; and
- Clarity and thoroughness of the Applicant’s proposed approach for addressing the challenges of synchrophasor application use such as business processes related to data quality management, training simulators, etc.

Criterion 2:
IMPACT AND UNDERSTANDING (20%)
- Thoroughness and breadth of Applicant’s understanding of the current trends, state of deployment, deployment challenges, and industry needs related to utilization and adoption of synchrophasor applications;
- Likelihood that the Applicant’s project would result in the eventual deployment of a production-grade software application at a utility/transmission owner/transmission operator by the end of the project period;
- Degree to which the collaboration and work would facilitate sustained utilization of the software application in the utility’s/transmission owner’s/transmission operator’s operations; and
- Degree to which the application fosters or provides for continued, widespread adoption of the software application.
Criterion 3: 
TECHNICAL APPROACH (20%)
- Adequacy and feasibility of the Applicant’s approach to develop a workable collaboration between the software vendor/developer and utility/transmission owner/transmission operator;
- Appropriateness, rationale, and completeness of the proposed Statement of Project Objectives (SOPO);
- Adequacy, reasonableness, and soundness of the proposed plan for coordinating, directing, and performing the proposed work; and managing risks associated with deploying a production-grade synchrophasor application within a utility/transmission owner/transmission operator environment;
- Feasibility and adequacy of the project timetable and task dependencies as outlined in the Project Management Plan (PMP) to successfully accomplish project objectives (defined in SOPO) on time and within the proposed budget; and
- Clarity, breadth, and reasonableness of the Applicant’s proposed Data Management Plan, including the steps envisioned to broadly share data and disseminate findings within the utility/transmission owner/transmission operator community.

Criterion 4: 
CAPABILITIES AND FACILITIES/EQUIPMENT OF THE PROJECT TEAM (30%)
- Credentials, capabilities, and experience of key personnel, including familiarity with current work in the synchrophasor field;
- Adequacy and appropriateness of the team members’ facilities/equipment to accomplish the project objectives;
- Project team’s demonstrated success having commercialized software application(s) similar to that/those to be demonstrated through this FOA, including, if appropriate, standing agreements with software vendors/developers for commercialization; and
- Level of short-term and long-term commitment of the project team to consider eventual adoption of a commercial-grade implementation of the proposed application, including that indicated in the utility/transmission owner/transmission operator letter of commitment.

Program Policy Factors
The selection official will consider the following program policy factors in the selection process:

1. Desirability to select projects for award to optimize use of available funds by allowing more projects to be supported while not being detrimental to the overall objectives of the program.
2. Desirability to select projects for award to leverage previous DOE funding.
3. Desirability to select projects for award that result in a portfolio of projects that yields the greatest impact to future synchrophasor software application adoption for bulk power system planning and operations.
4. Desirability to select projects for award that represent a diversity of Applicant firm sizes, demonstration area sizes, technology maturities, and geographic locations.

B. REVIEW AND SELECTION PROCESS

1. Merit Review
Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance." This guide is available at http://energy.gov/management/office-management/operational-management/financial-assistance under Financial Assistance Policy and Guidance.

2. Selection
The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.
Recipient Integrity and Performance Matters (DECEMBER 2015)

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313);

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM;

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in §200.205 Federal awarding agency review of risk posed by applicants.

3. Discussions and Award

Government Discussions with Applicant (December 2014)

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

DOE anticipates notifying applicants selected for award by September 30, 2016 and making awards by November 30, 2016.
A. AWARD NOTICES

1. Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Section IV.G with respect to the allowability of pre-award costs.)

Non-selected Notification

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

Notice of Award (December 2014)

An Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes either as an attachment or by reference: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE; (4) 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, awards made under this funding opportunity should include the government-wide Research Terms and Conditions. A new version of the Terms and Conditions based on the changes to 2 CFR 200 is not yet available. Once the Terms and Conditions become available, they will be located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp. If an award is made under this funding opportunity before the Terms and Conditions are posted, alternative Terms and Conditions may be included in the award.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements (December 2014)

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation] (See: http://www.eCFR.gov). For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, awards made under this funding opportunity will include the government-wide Research Terms and Conditions. A new version of these Terms and Conditions based on the changes to 2 CFR 200 is not yet available. Once they become available, they will be located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp. If an award is made under this funding opportunity before the Terms and Conditions are posted, alternative Terms and Conditions may be included in the award.

DUNS AND SAM REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR, Part 25 (See: http://www.eCFR.gov). Prime awardees must keep their data at the System for Award Management (SAM) current at http://www.sam.gov current SAM is the government-wide system that replaced the CCR. If you had an active registration in the CCR, you have an active registration in SAM. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.
SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR, Part 170. (See: http://www.eCFR.gov). Prime awardees must register with the new FSRS database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the System for Award Management (SAM).

2. Special Terms and Conditions and National Policy Requirements (December 2014)


The National Policy Assurances To Be Incorporated As Award Terms are located at http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf


Lobbying Restrictions. By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

Corporate Felony Conviction and Federal Tax Liability Representations (MARCH 2014)

In submitting an application in response to this FOA the Applicant represents that:

(1) It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months; and

(2) It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definition applies:
A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS REPRESENTATIONS (JUNE 2015)

In submitting an application in response to this FOA the Applicant represents that:

(1) It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contractors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) It does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
   a. “These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a
violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.”

b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

Notwithstanding provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

FOREIGN NATIONAL INVOLVEMENT

All applicants selected for an award resulting from this FOA may be required to provide information to the Department of Energy (DOE) in order to facilitate our responsibilities associated with foreign national access to DOE sites, information, technologies, equipment, programs, or personnel. Foreign national is defined as any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government, and has not been naturalized under U.S. law. If the selected applicant, including subrecipients/contractors, anticipates utilizing a foreign national in the performance of an award, the selected applicant may be responsible for providing to the DOE specific information about the foreign national(s) to ensure compliance with all of the requirements for access approval. Access approval for individuals from countries identified on the U.S. Department of State list of State Sponsors of Terrorism must receive final approval authority from the Secretary of Energy before they can commence work.

C. REPORTING

Section VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions and comments concerning this FOA shall be submitted not later than 3 calendar days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE/NNSA cannot answer these questions.

B. AGENCY CONTACT

Name: Sheldon Funk
E-mail: Sheldon.Funk@netl.doe.gov
Telephone: (304) 285-0204
Section VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages [Insert pages] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.
F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

Program Covered Under Special Protected Data (December 2014)

Special Protected Data Statutes. This program is covered by a special protected data statute. The provisions of the statute provide for the protection from public disclosure, for a period of up to two (2) years from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data Programs Covered Under Special Protected Data Statutes (Item 4 under 2 CFR 910 Appendix A to Subpart D), would apply to an award made under this announcement. This provision will identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will also identify data that will be recognized by the parties as protected data.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784 see http://www.energy.gov/gc/services/technology-transfer-and-procurement/office-assistant-general-counsel-technology-transfer-1 for further information. Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

I. CONFERENCE SPENDING (FEBRUARY 2015)

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed $20,000, thereby
circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

J. FOREIGN ENTITY WAIVER REQUEST

As set forth in Section III.A.3, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a prime recipient, it must designate a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the prime recipient.

To request a waiver for this requirement, the Applicant must submit a waiver request in the Full Application, which includes the following information: entity name, country (or state) of incorporation, description of the work to be performed by that entity, and the location where the work will be performed. If the applicant is seeking a waiver to have a foreign entity serve as the prime recipient, the applicant must explain why it is necessary to have a foreign entity serve as the prime recipient. Waiver requests should explain how the waiver would further the purposes of this FOA and otherwise serve the interests of the Department of Energy. The Contracting Officer may require additional information before considering the waiver request. Save the Waiver Request(s) in a single file titled: "LeadOrganization_Waiver.pdf".
Section IX - APPENDICES/REFERENCE MATERIAL

Data Management Plan Guidance

A Data Management Plan (“DMP”) explains how data generated in the course of the research or work performed under an assistance award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed research work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (e.g., export control laws), and DOE regulations, orders, and policies.

Data Determination for a DMP

The Principal Investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed research/work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as “protected data”) and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed research work at private expense that will be used in the course of the proposed research work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as “limited rights data”). Any use of limited rights data or labeling of data as “protected data” must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:
**Data Types and Sources:** A brief, high-level description of the data to be generated or used through the course of the proposed research work and which of these are considered digital research data necessary to validate the research findings or results.

**Content and Format:** A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

**Sharing and Preservation:** A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and redistribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections, systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

**Protection:** A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

**Rationale:** A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

**Additional Guidance**

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the DMP Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large. DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the project description/scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, DOE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DOIs). In most cases, DOE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

**Definitions**

**Data Preservation:** Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.
Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a web-based platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study."

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.