

**DEPARTMENT OF ENERGY  
OFFICE OF SCIENCE**



**NATIONAL QUANTUM INFORMATION SCIENCE  
RESEARCH CENTERS**

**FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:  
DE-FOA-0002253**

**FOA TYPE: Amendment 000002  
CFDA NUMBER: 81.049**

<b>FOA Issue Date:</b>	<b>01/10/2020</b>
<b>Amendment 000001 Issue Date:</b>	<b>01/27/2020</b>
<b>Amendment 000002 Issue Date:</b>	<b>03/10/2020</b>
<b>Submission Deadline for Letters of Intent:</b>	<b>Not Applicable</b>
<b>Submission Deadline for Pre-Applications:</b>	<b>02/10/2020 at 5 PM Eastern Time A Pre-application is required</b>
<b>Pre-Application Response Date:</b>	<b>03/10/2020</b>
<b>Submission Deadline for Applications:</b>	<b>04/10/2020 at 5 PM Eastern Time</b>

**The application due date will NOT be extended as a result of this amendment.**

**Description of Amendment 000002:** *(This description is only a summary of the changes made by this amendment. The entire Funding Opportunity Announcement (FOA), including the actual revisions made by Amendment No. 000002, should be carefully reviewed by all prospective applicants.)*

1. Section I – FUNDING OPPORTUNITY DESCRIPTION

- A. Under “QIS Ecosystem Stewardship”, Footnote 4 is revised to add an additional link for information on SC QIS programs. **(Page 8 of this amended FOA)**
- B. Under “RESPONSIVENESS”, a bullet is added to specify that full applications in which non-domestic participation is proposed but is not identified in Table 1 or for which a justification is not provided via an addendum to Table 1 will be deemed non-responsive. **(Page 12 of this amended FOA)**

2. Section III - ELIGIBILITY INFORMATION

- A. In sub-section A. ELIGIBLE APPLICANTS, a statement is added specifying that if an application is received in which non-domestic participation is proposed but is not identified in Table 1 or for which a justification is not provided via an addendum to Table 1, the application will be deemed non-responsive and rejected without further review. **(Page 17 of this amended FOA)**
- B. Sub-section B. COST SHARING AND INSTITUTIONAL COMMITMENTS is updated to finalize the cost share requirements, now that a determination has been issued on the waiver, as the original FOA stated would be done. A paragraph containing background information originally included to explain the necessity of a waiver has been removed. **(Pages 18-19 of this amended FOA)**
- C. Sub-section D. OTHER ELIGIBILITY REQUIREMENTS the paragraph labeled “TEAM ARRANGEMENTS” was revised to add a note about proposed first- and second-tier subawardees and how their budgets will impact the calculation of the percentage of the effort that a subawardee will perform. This calculation will be used to determine if the requirement is met that the designated lead institution must perform a greater percentage of the effort than any other partner organization or subawardee. **(Page 20 of this amended FOA)**

3. Section IV – APPLICATION AND SUBMISSION INFORMATION

- A. In sub-section D.2., under “DOE COVER PAGE”, a statement is added under Table 1, specifying that if an application is received in which non-domestic participation is proposed but is not identified in Table 1 or for which a justification is not provided via an addendum to Table 1, the application will be deemed non-responsive and rejected without further review. **(Page 35 of this amended FOA)**

- B. In sub-section D.2., under “DOE COVER PAGE”, a “Notice for Tables 1, 2 and 3” is added, advising that Excel templates for these tables is provided in Grants.gov and should be used for preparing the tables and should also be submitted to DOE via the email address provided. Additionally Table 3 is revised to include separate columns for the Center PI’s first name and last name, and to add clarifying information to some column and row titles. **(Page 36 of this amended FOA)**
  - C. In sub-section D.2., under Appendix 12, instructions are added to specify that only one letter should be submitted per institution. **(Page 45 of this amended FOA)**
4. Section V – APPLICATION REVIEW INFORMATION
- A. In sub-section A.1. Initial Review Criteria, a bullet was added to address the requirement that any proposed non-domestic participation be identified in Table 1 and be justified via an addendum to Table 1. **(Page 60 of this amended FOA)**
  - B. In sub-section A.2. Merit Review Criteria, under “JUSTIFICATION FOR CENTER-SCALE EFFORT, INCLUDING COHESION AND INTEGRATION OF THE RESEARCH ACTIVITIES”, the first bullet is revised to clarify that the consideration of the need for a multi-disciplinary effort includes the involvement of national laboratories, academia, non-profit research institutes, and the private sector in the effort, as discussed in Section I. **(Page 61 of this amended FOA)**
  - C. In sub-section B.4., Program Policy Factors, the sixth bulleted program policy factor is revised to clarify that the consideration of participation with multi-institutional teams includes the involvement of of national laboratories, academia, non-profit research institutes, and the private sector, as discussed in Section I. **(Page 65 of this amended FOA)**

**Description of Amendment 000001:** *(This description is only a summary of the changes made by this amendment. The entire Funding Opportunity Announcement (FOA), including the actual revisions made by Amendment No. 000001, should be carefully reviewed by all prospective applicants.)*

1. Section I – FUNDING OPPORTUNITY DESCRIPTION

- A. Questions regarding the content of the FOA must now be submitted through the FedConnect portal. To implement this change, the title “GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO” was replaced with “GENERAL INQUIRIES ABOUT THIS FOA”. Two paragraphs were added to provide information regarding FedConnect. The Technical/Scientific Program Contact was moved to a separate subsection, as questions regarding the content of the FOA are to be submitted through FedConnect rather than by contacting the Technical/Scientific Program Contact directly. **(Page 1 of this amended FOA)**
- B. Under “Technical Areas of Interest”, clarification is added regarding the Technical Areas of Interest and the examples of subtopics. **(Page 6 of this amended FOA)**
- C. Under “QIS Ecosystem Stewardship”, Footnote 4 is revised to add additional links for current SC QIS programs. **(Page 8 of this amended FOA)**
- D. Under “Responsiveness”, a bullet was added to address the added requirement under “Teaming Arrangements” in Section III (see below). **(Page 12 of this amended FOA)**

2. Section III - ELIGIBILITY INFORMATION

- A. Sub-section D. OTHER ELIGIBILITY REQUIREMENTS was revised to add the paragraph labeled “TEAM ARRANGEMENTS”, which requires that the designated lead institution, i.e., the prime applicant, perform a greater percentage of the effort than any other partner organization or subawardee. **(Page 20 of this amended FOA)**
- B. Sub-section D. OTHER ELIGIBILITY REQUIREMENTS was revised to add the paragraph labeled “LIMITATION ON THE NUMBER OF PRE-APPLICATIONS”, which clarifies that an individual may be the Center Director on no more than one pre-application and that an institution may be the Lead Institution on no more than one pre-application. **(Pages 20-21 of this amended FOA)**

3. Section IV – APPLICATION AND SUBMISSION INFORMATION

- A. In Sub-section B.2. Pre-application, language under “PRE-APPLICATION REVIEW” regarding feedback was revised to specify the timing and means of

feedback in the paragraph starting with “Each pre-application will be reviewed...”  
**(Page 25 of this amended FOA)**

- B. Sub-section D. CONTENT AND APPLICATION FORMS was updated with instructions regarding how to propose Cost Share. These instructions have been added in three places: (1) in the second paragraph under 3. Research And Related Budget; (2) in the first paragraph under the heading BUDGET JUSTIFICATION (FIELD L ON THE FORM); and (3) in the second paragraph under 4. R&R Subaward Budget Attachment(s) Form. **(Pages 46, 49 & 50 of this amended FOA)**
4. Section V – APPLICATION REVIEW INFORMATION
- A. In sub-section A.1. Initial Review Criteria, a bullet was added to address the added requirement under “Teaming Arrangements” in Section III (see above). **(Page 59 of this amended FOA)**
5. Section VII - QUESTIONS/AGENCY CONTACTS
- A. Sub-section A. QUESTIONS was updated to reflect that questions regarding the content of the FOA must now be submitted through the FedConnect portal. Information regarding registering for FedConnect and deadlines for question submission is included. **(Page 70 of this amended FOA)**

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## **UPDATES AND REMINDERS**

### RECOMMENDATION

The Department of Energy (DOE) Office of Science (SC) encourages you to register in all systems as soon as possible. You are also encouraged to submit pre-applications and applications well before the deadline.

### AVOIDING ERRORS

The following advice is compiled from actual experiences of applicants for SC financial assistance awards.

- Please ensure that the project narrative is comprised of one and only one Portable Document Format (PDF) file, including the DOE Cover Page and all appendices, when it is attached to the SF-424 (R&R) form.
- When using the Portfolio Analysis and Management System (PAMS) website at <https://pamspublic.science.energy.gov>, please avoid using the back-arrow button in your web browser to navigate.
- Please ensure that the application contains no protected personally identifiable information (PII).
- Please ensure that the budget is calculated using the applicable negotiated indirect cost and fringe benefit rates.

### GRANTS.GOV WORKSPACE

Applications submitted through Grants.gov at <https://www.Grants.gov> must be submitted through a “Workspace” or the applicant’s system-to-system service. Workspace permits members of a team to simultaneously work on their application in an online collaborative environment. Application forms may exist as both online webforms and downloadable forms. More information is available at <https://www.Grants.gov/web/grants/applicants/workspace-overview.html>.

### DATA MANAGEMENT PLAN

Applications submitted under this FOA are subject to the Office of Science Statement on Digital Data Management, published at <https://science.osti.gov/funding-opportunities/digital-data-management/>. Compliance with this statement is detailed in Part IV of this FOA.

### ACKNOWLEDGMENT OF FEDERAL SUPPORT

SC published guidance about how its support should be acknowledged at <https://science.osti.gov/Funding-Opportunities/Acknowledgements>.

## **Section I – FUNDING OPPORTUNITY DESCRIPTION**

### **GENERAL INQUIRIES ABOUT THIS FOA:**

Questions regarding the content of the FOA 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. More information is available on the FedConnect website ([www.fedconnect.net](http://www.fedconnect.net)).

Questions pertaining to the FedConnect registration process or the submission of questions through FedConnect should be directed by e-mail to [support@FedConnect.net](mailto:support@FedConnect.net) or by phone to the FedConnect Support Center at 1-800-899-6665.

### **TECHNICAL/SCIENTIFIC PROGRAM CONTACT:**

Dr. Ceren Susut, Advanced Scientific Computing Research  
[Ceren.Susut-Bennett@science.doe.gov](mailto:Ceren.Susut-Bennett@science.doe.gov)

### **STATUTORY AUTHORITY**

Public Law 95-91, Section 646, US Department of Energy Organization Act  
Public Law 109-58, Energy Policy Act of 2005  
Public Law 115-368, National Quantum Initiative Act

### **APPLICABLE REGULATIONS**

Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 CFR 200  
U.S. Department of Energy Financial Assistance Rules, codified at 2 CFR 910  
U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 CFR 605

### **SUMMARY**

DOE SC hereby announces its interest in receiving applications from multi-institutional, multi-disciplinary teams (requesting support between \$10 and \$25 million per year) to establish National Quantum Information Science Research Centers referred to in the rest of this announcement as “Centers.” The goal of this FOA is to select applications that will accelerate the transformational advances in basic science and quantum-based technology needed to develop world-leading capabilities in Quantum Information Science (QIS), and in support of the National Quantum Initiative Act.<sup>1</sup>

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<sup>1</sup>Public Law 115-368, <https://www.congress.gov/115/bills/hr6227/BILLS-115hr6227enr.pdf>

This FOA is open to multi-institutional proposals submitted as a single application by the lead institution. Submitted applications must follow the guidelines and criteria provided in the supplementary information below and the following sections. Pre-applications are required and must be submitted by 02/10/2020. A response encouraging or discouraging the submission of a proposal will be provided by 03/10/2020. Only encouraged applications will be considered for merit-review. Applications submitted on behalf of investigators that did not submit a pre-application and applications that do not follow the guidelines and criteria established below may be declined without merit review.

## **SUPPLEMENTARY INFORMATION**

### **BACKGROUND**

The ability to exploit intricate quantum mechanical phenomena to create fundamentally new ways of obtaining and processing information is at the threshold of a revolution. The rapid progress in this field promises profound impacts on scientific discovery and technological innovation in the coming decades. In competitive terms, QIS is creating potentially transformative opportunities and technically complex, urgent challenges for the Nation, as growing international interest and investments fuel accelerating global activity in quantum science and technology. These opportunities and challenges demand a long-term, large-scale commitment of U.S. scientific and technological resources to multi-institutional, multi-disciplinary efforts that are commensurate with world leadership in this pivotal field. This has been recognized on the Federal level with the recent issuance of a National Strategic Overview for Quantum Information Science in September 2018<sup>2</sup> and the subsequent enactment of the National Quantum Initiative Act in December 2018.<sup>1</sup> DOE, with its unparalleled breadth and depth of activity as the Nation's leading supporter of basic research in the physical sciences, and drawing on the unique expertise and capabilities of the DOE National Laboratory complex, has key resources and infrastructure that are integral to this strategic and targeted U.S. initiative.

DOE SC will provide support for the establishment of Centers to accelerate the transformational advances in basic science and quantum-based technology needed to assure continued U.S. leadership in QIS, consistent with the National Quantum Initiative. The purpose of these Centers will be to push the current state-of-the-art science and technology toward realizing the full potential of quantum-based applications, from computing, to communication, to sensing. The multi-disciplinary nature of the field, the reliance on complex, sophisticated, and precise physical arrangements in order to observe and utilize quantum behavior, and the potential for substantial economic consequences are the major drivers of the National Quantum Initiative. The Centers, coupled with a robust core research portfolio stewarded by the individual SC programs, will create the ecosystem needed to foster and facilitate advancement of QIS with public benefits in national security, economic competitiveness, and leadership in scientific discovery.

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<sup>2</sup> National Science and Technology Council publication, <https://www.whitehouse.gov/wp-content/uploads/2018/09/National-Strategic-Overview-for-Quantum-Information-Science.pdf>

This FOA delineates the expectations, scope, and other parameters for such Centers. It follows an earlier [Notice of Intent and Request for Information \(RFI\)](#) on Quantum Information Science Centers that sought community input on topic areas, organization, requirements, review criteria, and assessment processes to be considered.<sup>3</sup>

Realizing the full potential of QIS requires a detailed understanding of how quantum components and systems behave, accurate knowledge of how to integrate the components into complex systems, and precise control of the corresponding structures and functionalities. Numerous questions remain, ranging from how quantum interactions may enable innovation through the creation of novel quantum systems, to how these new quantum technologies can advance our understanding of the natural world at the most fundamental levels.

To further the goals of this Announcement, and to advance a statutory purpose of the Centers to improve U.S. competitiveness, DOE intends to issue a Determination of Exceptional Circumstances (DEC) or other determination to modify the intellectual property rights in any technology developed under this FOA to meet its obligations to maintain and protect critical national interests in United States leadership in quantum information science and its technology applications. The terms and conditions of each award, therefore, will include a commitment that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States, unless the applicant can show to the satisfaction of DOE that it is not commercially feasible to do so (referred to hereinafter as “the U.S. Competitiveness Provision”). See Section VIII. F. of this FOA for further details.

The traditional linear model of discovery science leading to design, development, and commercial deployment will be insufficient to realize this potential at an acceptable pace, due to the urgency and scale of our mission. Rather, there is a need for bold, synergistic Center approaches that collectively couple all elements of the science and technology (S&T) innovation chain in a co-design framework, whereby the levels of the chain mutually feedback and reinforce each other throughout the lifetime of the Centers. The Centers will combine the talents of universities, national labs, other federal agencies, and the private sector in concerted efforts to support rapid progress and economic advancement. Thus, each Center is expected to demonstrate the following attributes, which are reflected in the Center Development and Management Requirements described below and in Merit Review Criteria in [Section V](#):

- **Significant National Impact:** With the goal of advancing basic research in QIS and improving the competitiveness of the United States, the Centers will catalyze the wider scientific/technical communities related to their focus areas and serve as national resources, conveners, and leaders. The potential impact of success must be significant.

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<sup>3</sup> Notice of Intent and Request for Information: Quantum Information Science Centers, 84 Fed. Reg. 22834 (May 20, 2019), <https://www.federalregister.gov/documents/2019/05/20/2019-10427/notice-of-intent-and-request-for-information-quantum-information-science-centers>

- **Major Cross-Cutting Challenge:** Each Center will attack a major challenge of sufficient difficulty and urgency to warrant a large, multi-institutional, multi-disciplinary effort to be jointly supported by multiple programs in SC.
- **S&T Innovation Chain:** Each Center will advance both science and technology in its focus area, accelerating progress from discovery to prototypical technology and applied research, through coupled co-design approaches.
- **QIS Ecosystem Stewardship:** The Centers will complement the existing QIS base research and other related activities within individual SC program offices, and will represent coherent efforts beyond the scope of what would normally be supported by those programs individually. Additionally, the Centers will leverage other investments in DOE research and facilities; create synergies with efforts developed by other federal agencies, the private sector, and academia; and contribute to the Nation's workforce development in QIS.
- **Multi-disciplinary Leadership:** Each Center will be led by a team of experts in the multiple disciplines that blend basic scientific research, and early stage technology development, engineering design and prototype development, drawing on expertise from DOE labs, academic institutions, and industry, as appropriate.
- **Collaborative Management Structure:** Each Center will achieve self-integration across the science and engineering disciplines that it spans such that the whole is greater than the sum of its parts. A clearly defined approach will create a synergistic team-focused culture for the Center. Active management is expected, with flexible roadmapping and well-defined processes for mid-course corrections.
- **Well-Structured Plan and Metrics:** Each Center will have clearly defined near, intermediate, and long-term goals, milestones, and deliverables as well as metrics of success. The metrics will be justified as evidence-based assessments of impact and accomplishments.

Pursuant to this FOA, and subject to the availability of appropriations, SC expects to establish at least two multi-disciplinary QIS Centers, to be funded at between \$10 million and \$25 million per year for a 5-year award term, to conduct basic research to accelerate the advancement of QIS and related technology.

Funding will be competitively awarded to the successful applicants selected by DOE Federal officials, based on rigorous review procedures as detailed in [Section V](#) of this FOA. Regular science and management reviews sponsored by federal officials with panels of external experts will ensure that the Centers are making progress towards their established goals, are at the cutting edge of research and development, have appropriate interactions with partners and industry entities, and have continually implemented effective management processes.

## CENTER DEVELOPMENT AND MANAGEMENT REQUIREMENTS

### Overview

The Centers will take a holistic approach to S&T and act as an integrator of research and development. The cross-cutting challenges to be addressed by the Centers are inherently multi-disciplinary. The Centers will require personnel with varied skills and expertise in a wide range of scientific and engineering disciplines. This depth is required for the Centers' research teams to

understand the potential roadblocks and bottlenecks that must be overcome to have significant national impact in QIS. Drawing expertise from DOE labs, academic institutions, and industry as appropriate, the Centers will need to combine exceptional skill and creativity in basic scientific research with cutting-edge expertise in early-stage technology development, engineering design, and prototype development for the specific problems to be addressed.

This will require the Centers to be built on a multi-dimensional structure using essential components as outlined below. This multi-dimensional structure allows considerable flexibility in defining the mission and scope of a Center but it will also ensure that each Center addresses the seven attributes described above. It is the task of applicants to construct the Center as an integrated, synergistic whole that makes a compelling argument for impacts that require the Center-scale investment. It is also the task of applicants to propose metrics to evaluate the Center's impact, and to justify how these metrics will assess the accomplishments of the Center in the context of its mission and goals.

**The following Essential Components must be incorporated in each Center:**

- S&T Innovation Chain and Co-Design
- Technical Areas of Interest – topics and sub-topics
- QIS Ecosystem Stewardship
- Management Structure
- Instrumentation and Facilities

These essential components are elaborated upon in the subsequent sections, and are reflected accordingly in the Merit Review Criteria in [Section V](#).

**S&T Innovation Chain and Co-Design**

The QIS S&T innovation chain is the core structure on which the QIS Centers are to be built. This innovation chain comprises the following levels:

- Applications
- Prototypes
- Systems
- Devices
- Fundamental Science

**Each Center must address and integrate *at least three* levels of the chain including fundamental science and must blend basic research, engineering, and technology development in a *co-design framework*.** Co-design involves multi-disciplinary collaboration that enables synergistic feedbacks among the interdependent levels of the S&T innovation chain for advancing basic research in QIS and accelerating the development of revolutionary technologies. For the duration of its work, each Center must implement a co-design approach across the levels of the chain that it includes.

The collective work of the QIS Centers will span basic research to engineering and technology development with a potential transition to industrial development. The QIS Centers will support multi-disciplinary research and development focused on the scientific barriers to enable new generations of quantum-enabled devices, systems, and prototypes across a range of applications. The Centers will advance highly promising areas of quantum information S&T from their early stages of research to the point that the risk level will be low enough for further development by industry and successful deployment of new technologies into the marketplace. As such, the Centers are expected to have deliverables or benchmarks that help focus the objectives of the research to the proposed short, intermediate, and long term goals they are addressing. Each Center must have deliverables or benchmarks that are appropriate to the levels of the S&T innovation chain that it addresses.

### **Technical Areas of Interest**

As emphasized in the earlier Notice of Intent and Request for Information regarding this solicitation, **it is expected that each Center will address the needs of the research communities stewarded by more than one DOE SC program office for the public benefit, and integrate elements from multiple technical areas of interest. Each Center must integrate sub-topics from *at least two* of the Technical Areas of Interest listed in bold below. Subsidiary bullets provide examples of subtopics. While the lists of subtopics should not be considered exhaustive, additional subtopics that are proposed should be consistent with the Technical Areas of Interest.**

- **Quantum Communication**
  - Requirements for scalable and adaptable quantum network infrastructures designed to support the transmission of diverse types of quantum information
  - Fundamental limits on information transfer in quantum systems
  - Communication techniques and tools exploiting entanglement
  - Test facilities to support network development and test
- **Quantum Computing and Emulation**
  - System architecture selection and optimization for problem domains studied by SC-supported investigators
  - Qubit device requirements to match architectural plans
  - Development of novel and improved algorithms and programming paradigms for selected architectures
  - Programmable modular quantum emulator development addressing uses for SC-supported researchers (incorporating requirements input from all SC offices), including analog simulators
  - System integration of emulation, quantum communication, and quantum compute systems from device/array level up
  - Testbeds for performance measurement and algorithm development; modeling and integration of computing/communication
  - Fundamental limits of quantum computation
  - Capabilities, limitations, and new approaches with respect to error correction

- **Quantum Devices and Sensors**
  - Development of requirements for qubit devices for quantum sensor and detector applications
  - Development of devices to meet quantum communication or quantum computation application requirements
  - Progress on quantum-enabled imaging devices and systems, such as for soft-matter imaging, magnetic mapping, or improved microscopy
  - Development of integration, interface, transduction, and control schemes for quantum device arrays
  - Improving device coherence, qubit lifetime, and other performance parameters
  - Modeling of device and controls performance
  - Synthesis and fabrication of engineered quantum devices
- **Materials and Chemistry for QIS Systems and Applications**
  - Requirements for materials research for quantum communication, computing, emulation, sensing, and imaging applications
  - Fundamental theory of materials and molecular systems for quantum applications
  - Research leading to materials and molecular systems that control quantum phenomena to meet quantum communication, computation, and sensor requirements
  - Fundamental research on device physics for next generation QIS systems, including interface science and modeling of materials performance
  - Synthesis, characterization, and fabrication research for quantum materials and processes, including integration in novel device architectures
- **Quantum Foundries**
  - Synthesis of quantum materials, structures, and devices with atomic precision
  - Fabrication and integration of photon, superconducting, spin and other qubit systems
  - Advanced instrumentation and tool development for quantum computers, sensors, and metrology
  - Facilities to support device test, packaging, and integration

### **QIS Ecosystem Stewardship**

This essential component concerns a Center's interactions with the other Centers; other research entities and facilities of the DOE such as the Nanoscale Science Research Centers, the Energy Frontier Research Centers, the Energy Innovation Hubs, and the DOE labs; programs funded by other federal agencies such as National Science Foundation's Quantum Leap Challenge Institutes and National Institute of Standards and Technology's Quantum Economic Development Consortium (QEDC); academic institutions; and the private sector. These interactions should enable accelerated S&T innovation.

Each Center should describe its plans for forming partnerships and creating synergies as well as leveraging existing research, technologies, capabilities, resources, and facilities. The plans may

include (but are not limited to) research partnerships, research personnel exchanges, institution-sponsored post-doctoral or graduate fellowships, involvement in the Center advisory board, and multi-institutional seminars and conferences. Each Center must have an external advisory board that includes industry, academic, and federal laboratory participation.

Applicants are also encouraged to provide information regarding their plans to create a collaborative research environment to enable cognizance of industry readiness and technology transfer and to contribute to the broader development and stewardship of the national QIS capability and ecosystem. For instance, in pursuing their specific goals, the Centers will likely discover new avenues in basic research and in technology development. To the extent that such new opportunities diverge from the Center's primary mission, these should be "spun out" as potential candidates for support from other programs within or outside of the DOE or from industry. Applicants should be explicit about how they will work with QEDC and its members to enable such transitions.

For significant national impact of the Center investments, it is crucial that the Centers build on, not duplicate, existing S&T in the public and private sectors, and that they take maximum advantage of existing facilities. Applicants should explicitly describe the existing research, technologies, capabilities, resources, and facilities that they will exploit, and how they will leverage them. In particular, the plans should address existing DOE programs and investments in research and facilities. Information on current SC QIS programs can be found [here](#)<sup>4</sup> or on individual SC program office web pages.

Additionally, each Center should formulate a workforce development plan. This plan may include (but is not limited to) educational/training programs; opportunities for students, postdoctoral fellows, and visiting researchers; initiatives that facilitate engagement among industry, university, and lab researchers; and outreach activities in which the Center interacts with the public.

## **Management Structure**

Each Center must have a well-designed management structure for its establishment and operations. Key elements for the successful management of a Center include:

- A clear lead institution with strong scientific leadership, core location for the Center, and demonstrated experience managing complex interdisciplinary research and development teams. The lead institution must be a domestic organization.

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<sup>4</sup> DOE Office of Science Initiatives, <https://www.energy.gov/science/initiatives/quantum-information-science> ; Office Links: <https://science.osti.gov/ascr/Research/Quantum-Information-Science-QIS> ; <https://science.osti.gov/bes/Research/qis> ; <https://science.osti.gov/hep/Research/Quantum-Information-Science-QIS> ; and <https://science.osti.gov/np/Research/Quantum-Information-Science>

- A clear organization and evidence-based management plan for achieving the collaborative and synergistic goals of a Center and “infusing” a culture of empowered central research management throughout the Center. Each Center must identify a Center Director, a Center Deputy Director, and Leads for Major Thrust Areas as described below:
  - Center Director: The Center Director will be the Lead PI and must be employed by the Lead Institution. The Center Director will serve as the primary contact responsible for communications with the DOE on behalf of all of the principal investigators (PIs) in the Center.
  - Deputy Center Director: The Deputy Center Director will assist the Center Director in leading the Center and will serve as the secondary contact for the DOE.
  - Leads for Major Thrust Areas: The Leads for Major Thrust Areas will be responsible for leading and coordinating the Center PIs, research, technologies and activities under their Major Thrust Areas, which may include levels of S&T innovation chain, elements of technical areas of interest or activities involving QIS ecosystem stewardship such as interactions with different entities.
- When needed, a clear commitment to the use of state-of-the-art technology and frequent virtual meetings to enable meaningful long-distance collaboration.

Each Center must devise a detailed plan that supports this structure. This plan should directly address the following bullets and might include the representative examples described:

- Significant National Impact: Description of the activities to maximize the overall impact of the Center on advancing basic research in QIS as well as on improving the competitiveness of the United States. Each Center’s management structure must enable empowered scientist-managers to execute quick decisions to shape the course of research, building on flexible roadmaps and utilizing well-defined change processes.
- Goals, Milestones, and Metrics: Description of near, intermediate and long-term goals, milestones, and deliverables as well as metrics of success that will enable innovation and advances in the S&T chain and in technical areas of interest, and provide meaningful evaluation of the Center’s role in the QIS ecosystem.
- Multi-disciplinary Collaboration: Description of the communication and coordination processes among different groups and task owners within the Center to achieve self-integration and avoid duplications. Outline of interdependencies among tasks, disciplines and institutions, including solutions to avoid situations where the progress of one institution or one group within the Center is stalled due to delay in the completion of another institution or group’s task.
- Staffing: Centers will be composed of diverse institutions including national laboratories, academia, non-profit research institutes, and the private sector, with individuals with forefront expertise in different methodologies, technologies, and disciplines. Researchers in leadership roles should have demonstrated scientific, technical, and managerial skills.

- Intellectual Property (IP): An IP management plan that formalizes the treatment of IP issues among Center members. A suggested template for this plan is in Appendix 10.
- Data Management Plan: Applications submitted under this FOA are subject to the [SC Statement on Digital Data Management](#). Compliance with this statement is detailed in [Section IV](#) of this FOA. The data management plan should also describe how a public-facing Center web-site will be developed and maintained. Participation of Centers in development, evaluation, and dissemination of proposed national and international standards, including standard reference materials and documentary standards, is also encouraged.

## Instrumentation and Facilities

Each Center will need to have available the technical capabilities and facilities that the applicant considers necessary to implement its proposed approach, including experimental, fabrication, and computational tools. A portion of the research at the Center may be devoted to developing new technological capabilities for overcoming challenges that cannot be addressed with currently available technologies and instrumentation. Research capabilities and resources to be accessed outside of the Center should be clearly identified.

While capital investment in instrumentation and start-up needs are expected as part of the Center awards, usage and leverage of existing facilities, including the Department's user facilities and other capabilities such as quantum computing testbeds and isotope production, is encouraged. DOE user facilities, including Light Sources, Neutron Scattering Sources, Nanoscale Science Research Centers, Advanced Computational Facilities, and other specialized user facilities, are considered foundational resources. As such, they are expected to serve as independent resources for the Centers funded under this FOA. Note however that access and time allocation for user research activities at DOE user facilities are determined and administered separately from this FOA and should not be included in the budget requests of applications to this FOA. In general, each facility manages the allocation of facility resources through merit-based peer review of submitted research proposals, which are evaluated for scientific merit by independent proposal review committees or panels, and for feasibility and safety by the facility, with those proposals that are most compelling being accepted and allocated time. More information on DOE user facilities including policies and processes is available [here](#)<sup>5</sup> and on individual facility web sites.

The Centers may develop agreements with respect to access to major scientific instrumentation, including DOE user facilities, on an as-needed basis rather than as an integral component of the initial Center request and budget, since funding at DOE user facilities is determined and administered separately from this FOA. However, Center proposals should include descriptions of any plans for utilizing or leveraging existing resources available at user facilities or elsewhere.

Strategies for the development of Centers may also include renovation of existing buildings and/or leasing buildings. The Centers will be funded at \$10-25 million in the first year. Part of

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5 DOE Office of Science User Facilities, <https://science.osti.gov/User-Facilities>

the initial funding may be used for infrastructure investment. Allowable costs include those necessary to house the Center (including a possible lease for the first five years of the project), to renovate laboratories as needed, and to purchase research equipment and instrumentation. Costs for new construction (including new buildings or additions to existing buildings) will not be allowed in Center awards.

#### POST-AWARD PROCESS

The awarded Centers' Directors will be asked to join a collective body named the Centers Executive Council. The Centers Executive Council will issue a joint Operating Plan for the Centers that will describe the coordination and communication processes among the Centers that will maximize the overall national impact. Specifically, the Operating Plan will detail processes for sharing and disseminating technical results and management best practices as appropriate. The Operating Plan will also include a joint workforce development statement that addresses the recruitment and the retention of skilled workforce, planned engagement activities with industry to facilitate technology transfer, and outreach efforts to the broader scientific community including international partners. The Operating Plan will be provisional and it will be updated periodically. It is expected that, as the Centers come to maturity, this Operating Plan will not only serve as a blueprint for their operations but it will also provide insights on how to further QIS and retain the Nation's leadership after the completion of their awards.

SC reviews of the Centers will occur periodically and will cover management processes as well as scientific and technical progress to ensure suitable progress towards the established goals. Federal oversight of the Centers will require regular oral and written communication with the Centers including formal, scheduled teleconferences concerning scientific/technical progress as well as key management issues. At the program level, management of the Centers will be closely coordinated across the SC program offices through a working group of senior technical program managers that will meet regularly. The cross-SC working group will ensure coordination, synergy, and complementarity among Centers and that a consistent management approach is applied in the review, assessment, and decision-making processes. An SC QIS Management Council, comprising the Associate Directors of the participating program offices and chaired by the SC Deputy Director for Science Programs, will provide high-level management oversight for all SC QIS Centers.

Finally, representatives from the awarded Centers will be expected to attend an annual PI meeting.

#### OPEN SCIENCE

SC is dedicated to promoting the values of openness in Federally-supported scientific research, including, but not limited to, ensuring that research may be reproduced and that the results of Federally-supported research are made available to other researchers. These objectives may be met through any number of mechanisms including, but not limited to, data access plans, data sharing agreements, the use of archives and repositories, and the use of various licensing schemes.

## MULTI-INSTITUTIONAL APPLICATIONS

Applications that fully respond to the purposes of this FOA will require the efforts of multiple institutions. Such applications must be submitted as a single application by the institution leading the joint effort. The lead application must include subaward budgets and budget justifications for all institutions participating in the joint effort, regardless of the type of organization (DOE National Laboratory, another Federal agency, an institution of higher education, or a for-profit organization). In certain situations, the value of proposed subawards will be broken out of an application recommended for award:

- DOE will fund its National Laboratories directly through the Field-Work system, and
- DOE will fund other Federal agencies and their FFRDCs separately.

SC may need to obtain applications through the PAMS website at <https://pamspublic.science.energy.gov> to directly fund its laboratories, other Federal agencies, or other Federal agency FFRDCs. Note that a well-thought-out research plan and its associated budget(s) should leave no confusion about which institution will do which parts of the research.

All entities submitting applications to this FOA must recognize the moral and legal obligations to comply with export controls and policies that limit the transfer of technologies with potential dual use. Applicants are reminded that international collaboration must comply with nonproliferation, sanction, and other protocols described at <https://www.export.gov>.

This FOA is to support scientific endeavors that could be described in scholarly publications. Do not submit applications containing restricted data or unclassified nuclear information as defined in the Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq., 10 CFR 1017, 10 CFR 1045.

## RESPONSIVENESS

All pre-applications and full applications received in response to this FOA will undergo a responsiveness review in addition to other initial review criteria as described in Section V. The following applications will be deemed unresponsive:

- Applications from single institutions (rather than a team of multiple institutions)
- Applications that designate a non-domestic organization as the lead institution
- Applications in which non-domestic participation is proposed but is not identified in Table 1 or for which a justification is not provided via an addendum to Table 1. (Required for pre-applications and full applications, but failure to provide will only result in an automatic determination of non-responsiveness for full applications).
- Applications in which the lead institution /prime applicant is not proposed to perform a greater percentage of the effort than any other single institutional partner, team member,

or subawardee, as determined by the budget (inclusive of any required cost sharing).

- Applications that do not incorporate each of the five Essential Components
- Applications that do not address and integrate at least three levels of the QIS S&T Innovation Chain
- Applications that do not include fundamental science as one of the levels of the QIS S&T Innovation Chain that they address
- Applications that do not integrate sub-topics from at least two of the Technical Areas of Interest

The unresponsive pre-applications will be discouraged to submit a full application. Only those with encouraged pre-applications may submit a full application. Unresponsive applications will be declined without merit review.

#### DEFINITION OF TERMS

##### **Quantum Information Science (QIS)**

Quantum Information Science (QIS) is a rapidly evolving area of science that builds on quantum science principles to obtain and process information in ways that cannot be achieved based on classical physics principles. QIS is based on the premise that information science depends on quantum effects in physics.

QIS—including quantum science and instrumentation for next-generation computing, sensing, communication, and other fields—thus arises from the synthesis of quantum theory and information theory. It springs from the recognition that uniquely quantum phenomena can be harnessed to advance information collection, processing, and fundamental understanding in ways that classical approaches can only do less efficiently, or not at all. Current and future QIS applications differ from earlier (and ongoing) applications of quantum mechanics, such as the laser, by exploiting distinct quantum behavior that does not have classical counterparts and does not arise in non-quantum systems, including:

- Superposition—quantum particles or systems exist across all their possible states at the same time, with corresponding probabilities, until measured.
- Entanglement—a superposition of states of multiple particles in which the properties of each particle are correlated with the others, regardless of distance.
- Squeezing—a method of manipulating noise in systems that obey the Heisenberg uncertainty principle, by permitting large uncertainty in one variable to improve precision in another correlated variable.

## **Section II – AWARD INFORMATION**

### **A. TYPE OF AWARD INSTRUMENT**

DOE may award cooperative agreements, Technology Investment Agreements (TIAs), field work authorizations, or interagency agreements under this FOA. A DOE field work authorization will be awarded to a successful DOE/NNSA Federally Funded Research and Development Center (FFRDC) contractor. Participation by non-DOE/NNSA Federal agencies and their FFRDC contractors' team will be funded under an interagency agreement. A cooperative agreement will be awarded to any other successful entity including, but not limited to, universities, non-profit organizations, and for-profit organizations.

DOE will only fund multi-institution collaborations under this FOA.

If determined appropriate, DOE will consider awarding a TIA to a non-FFRDC applicant. TIAs, governed by 10 CFR Part 603, are assistance instruments used to increase the involvement of commercial entities in the Department's research, development, and demonstration programs. A TIA may be either a cooperative agreement or an assistance transaction other than a cooperative agreement. In both cases, DOE has greater flexibility in tailoring the terms and conditions of a TIA, which is not subject to all of the requirements of 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation). Agreement terms are negotiable in areas such as audits and intellectual property rights that may cause concern for commercial firms that usually do not contract with the Federal Government. A non-FFRDC applicant may request a TIA if it believes it will be beneficial to the R&D objectives of the program. After an applicant is selected for award, the Contracting Officer will determine if awarding a TIA would provide benefits to the program that would not likely be realized under another type of assistance award. As described below, DOE will be more amenable to awarding a TIA in support of a proposal from a consortium or a teaming arrangement that includes cost sharing with the private sector. Such a consortium or teaming arrangement could include a DOE/NNSA FFRDC, other Federal agency or its FFRDC. If the DOE/NNSA FFRDC contractor is a part of a consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC contractor portion of the work will be authorized and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating (M&O) contract. Funding for another Federal agency or its FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations such as those involving intellectual property may be made through the appropriate agreement to facilitate the FFRDC's participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR Part 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

If a DOE/NNSA FFRDC contractor is a part of a consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC contractor portion of the work will be authorized

and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating (M&O) contract. Funding for another Federal agency or its FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations such as those involving intellectual property may be made through the appropriate agreement to facilitate the FFRDC's participation in the consortium or teaming arrangement.

## **B. ESTIMATED FUNDING**

DOE anticipates the Government share of the total value of awards over a five-year project period made under this FOA will be between \$100 million and \$625 million, subject to the availability of future year appropriations.

DOE is under no obligation to pay for any costs associated with preparation or submission of applications. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

## **C. MAXIMUM AND MINIMUM AWARD SIZE**

(See B. Estimated Funding section above.)

The award size will depend on the number of meritorious applications and the availability of appropriated funds.

### **Ceiling**

\$25,000,000 per year per award

### **Floor**

\$10,000,000 per year per award

## **D. EXPECTED NUMBER OF AWARDS**

(See [B. Estimated Funding](#) above.)

DOE anticipates making two to five awards under this announcement.

The exact number of awards will depend on the number of meritorious applications and the availability of appropriated funds.

## **E. ANTICIPATED AWARD SIZE**

(See [B. Estimated Funding](#) above.)

The award size will depend on the number of meritorious applications and the availability of

appropriated funds.

## **F. PERIOD OF PERFORMANCE**

(See [B. Estimated Funding](#) above.)

Awards are expected to be made for a period of five years.

Continuation funding (funding for the second and subsequent budget periods) is contingent on: (1) availability of funds appropriated by Congress and future year budget authority; (2) progress towards meeting the objectives of the approved application; (3) submission of required reports; and (4) compliance with the terms and conditions of the award.

## **G. TYPE OF APPLICATION**

DOE will accept only new applications under this FOA.

## **H. VALUE/FUNDING FOR DOE/NNSA NATIONAL LABORATORY CONTRACTORS AND NON-DOE/NNSA FFRDC CONTRACTORS**

For financial assistance awards, the value of, and funding for, a DOE/NNSA National Laboratory contractor, a non-DOE/NNSA FFRDC contractor, or another Federal agency's portion of the work will not be included in the award to the successful applicant. DOE will fund a DOE/NNSA National Laboratory contractor through the DOE field work authorization system or other appropriate process and will fund non-DOE/NNSA FFRDC contractors and other Federal agencies through an interagency agreement in accordance with the Economy Act, 31 U.S.C. 1535, or other statutory authority. However, the value of and funding of these organizations is part of the award size in C. above.

## **I. RESPONSIBILITY**

The successful prime applicant/awardee (lead organization) will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and any team member, and/or subawardee.

If an award is made to a DOE/NNSA National Laboratory, all Disputes and Claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory's M&O contract, as applicable, in consultation between DOE and the prime awardee.

If an award is made to another Federal agency or its FFRDC contractor, all Disputes and Claims will be resolved in accordance with the terms and conditions of the interagency agreement in consultation between DOE and the prime awardee.

### Section III – ELIGIBILITY INFORMATION

#### A. ELIGIBLE APPLICANTS

All types of domestic applicants are eligible to apply as lead applicants, except nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995. DOE will only fund multi-institution collaborations under this FOA.

Non-domestic institutions are ineligible to apply as prime applicants, but may apply as subawardees to the lead institution Applicants are advised that successful applications that include non-domestic institutions must include a detailed demonstration of how the non-domestic institution possesses skills, resources, and abilities that do not exist among potential domestic institutions. Therefore, all non-domestic participation must be identified in Table 1 of the pre-application and Table 1 of the full application, as a supplement to the cover page. Additionally, a justification for all non-domestic participation must be included as specified in Section IV. **If an application is received in which non-domestic participation is proposed but is not identified in Table 1 or for which a justification is not provided via an addendum to Table 1, the application will be deemed non-responsive and rejected without further review.**

#### DOE/NNSA NATIONAL LABORATORY CONTRACTORS

DOE/NNSA National Laboratory Contractor applicants are eligible to apply for funding as the lead organization or team member under this announcement if their cognizant DOE/NNSA Contracting Officer provides written authorization. This authorization should be submitted with the application as part of the Budget for DOE/NNSA National Laboratory Contractor File. [This is not required for the National Energy Technology Laboratory because it is a Government Owned/Government Operated (GOGO).] **Please note that failure to provide this authorization may result in rejection of a proposal without merit review.** If a DOE/NNSA National Laboratory Contractor is selected for award, or proposed as a team member, the proposed work will be authorized under the DOE field work authorization system or other appropriate process and performed under the laboratory Contractor's M&O contract, as applicable. The following wording is acceptable for the authorization:

“Authorization is granted for the \_\_\_\_\_ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory and will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory.”

#### NON-DOE/NNSA FEDERAL AGENCIES AND THEIR FFRDC CONTRACTORS

Non-DOE/NNSA Federal agencies and their FFRDC contractors are eligible for a prime award under this FOA and may be proposed as a team member on another entity's application subject to the following guidelines:

The prime applicant must obtain written authorization for non-DOE/NNSA FFRDC participation. The cognizant Contracting Officer for the Federal agency sponsoring the FFRDC contractor must authorize in writing the participation of the FFRDC contractor on the proposed project and this authorization should be submitted with the application. The written authorization must also contain a determination that the use of a FFRDC contractor is consistent with the contractor's authority under its award and does not place the FFRDC contractor in direct competition with the private sector, in accordance with FAR Part 17.5. **Please note that failure to provide this authorization may result in rejection of an application prior to merit review.** The following wording is acceptable for the authorization:

“Authorization is granted for the \_\_\_\_\_ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory and will not adversely impact execution of the (insert agency) assigned programs at the laboratory. This laboratory is authorized to perform the work proposed in the application submitted under DOE Funding Opportunity Announcement DE-FOA-0002253 by the following statutory authority (insert statute name, citation, and section).”

#### UNINCORPORATED CONSORTIA

Unincorporated consortia (team arrangements), which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative (lead organization) and the lead organization must be domestic. In these arrangements, while the consortium as a whole is unincorporated, the prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States.

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 and should discuss, among other things, the consortium's:

- 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 IP developed previously or under the agreement.

Note that a consortium is applied for in one application and results in one award with subawards to consortia members.

#### **B. COST SHARING AND INSTITUTIONAL COMMITMENTS**

Cost-sharing is not required for basic and applied research awarded under this FOA, except to for-profit entities. For-profit entities, whether prime recipients (lead organizations) or subawardees (team members), are required to provide not less than 20% cost share for both basic and applied R&D activities. This cost share is to be based on the portion of the total budget

proposed by each for-profit entity and is required to be not less than 20% of the total allowable R&D costs of that entity. Applicants must include any required cost share in their proposed budget justification, if applicable, as described in Section IV.D. Non-federal sources must provide all cost shared funding unless otherwise permitted by law. Cost sharing amounts proposed in the budget justification are subject to validation during the period of performance and/or during closeout of the award.

Additionally, demonstrations of institutional or third-party commitment to the proposed activity, as described in Section IV.D., Appendix 12, are strongly encouraged for all applications.

Examples of non-Federal contributions that may be considered as demonstrating institutional or third-party commitment include, but are not limited to, the following:

- The provision of space, facilities, equipment, or resources at no or reduced charge;
- The provision of release time for faculty;
- The provision of scholarship support for students; or
- The waiver of facilities and administrative costs, in whole or in part.
- Third party contributions (e.g., state, private entities, etc.)

The institutional commitment is not to be documented on the application's budget: It is not a formal cost sharing, but it must be described in Appendix 12.

Cost sharing and Institutional commitments may not include the following:

- Revenues or royalties from the prospective operation of an activity beyond the time considered in the award;
- Proceeds from the prospective sale of an asset of an activity; or
- Other Federal awards.

Additionally, cost sharing, may be required under a class patent waiver, if applicable, as discussed in Section VIII.G.

## **C. ELIGIBLE INDIVIDUALS**

Individuals with the skills, knowledge, and resources necessary to carry out the proposed research as a PI are invited to work with their organizations to develop an application for financial assistance. Individuals from underrepresented groups as well as individuals with disabilities are always encouraged to work with their organizations to develop an application for financial assistance.

## **D. OTHER ELIGIBILITY REQUIREMENTS**

### **TEAM ARRANGEMENTS**

Entities proposing as a team must designate a lead institution. Pre-applications and applications must be submitted on behalf of the team members by the lead institution. DOE will enter into a prime award relationship with the designated lead institution. Only one pre-application and one

application is to be submitted for each team. The designated lead institution, i.e., the prime applicant, must perform a greater percentage of the effort than any other single institutional partner organization or subawardee. The percentage of effort will be determined by reviewing the total budget (inclusive of any required cost sharing) for each participating organization as a percentage of proposed total project costs. **If an application is received in which the lead institution /prime applicant is not proposed to perform a greater percentage of the effort than each of the other institutional partners, team members, or subawardees, as determined by the budget, the application will be deemed non-responsive and rejected without further review.** Note: All proposed team member institutions should be proposed as first-tier subawardees to the prime (lead) applicant. The only exception should be a second-tier subawardee who is proposed to perform work that will only support the portion of the work to be performed by a particular first-tier subawardee team member, rather than the proposed Center as a whole. In such an instance, the second-tier subawardee's effort (as determined by the budget) would be attributed to the first-tier subawardee for purposes of determining if the lead institution/prime applicant is proposed to perform a greater percentage of the effort than any other single institutional partner, team member, or subawardee.

#### PRE-APPLICATION

**To be considered eligible for an award under this FOA, potential lead organizations are required to submit a pre-application in accordance with the instructions provided in [Section IV.B.2](#), and to receive notification from DOE that they are encouraged to submit a full application. Applications received from an applicant who has not submitted the required pre-application, or who has received notification from DOE that they are discouraged from submitting a full application, will be deemed non-responsive and will be rejected without further review.**

The Lead Institution identified in an application must be the same Lead Institution identified in the required pre-application. **If an application is received for which the Lead Institution has changed since submission of the pre-application, then the application will be deemed non-responsive and will be rejected without further review.** The lead Principal Investigator (Center Director) should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to other senior/key personnel and other participating institutions, although DOE discourages extensive changes.

#### LIMITATION ON THE NUMBER OF PRE-APPLICATIONS

An individual may be the Center Director on no more than one pre-application. An institution may be the Lead Institution on no more than one pre-application. There is no limitation on the number of pre-applications in which an institution may participate. If any of the following cases occur, the last received pre-application will be accepted and all other pre-applications will be declined without review:

- More than one pre-application is received with the same individual identified as the

Center Director,

Or

- More than one pre-application is received with the same institution identified as the Lead Institution.

#### CENTER DIRECTOR

Applications must designate one and only one investigator as the Center Director, who will exercise overall scientific control and direction of the proposed research. The Center Director must be employed by or have a written agreement in place to be hired by the Lead Institution. If the proposed Center Director will not be employed by the Lead Institution at the time of the award, the application may be declined without further review.

#### LIMITATION ON THE NUMBER OF APPLICATIONS

An individual may be the Center Director on no more than one application. An institution may be the Lead Institution on no more than one application. There is no limitation on the number of applications in which an institution may participate. If any of the following cases occur, the last received application that matches a qualified pre-application (as described in [Section IV B.](#), below) will be accepted and all other applications will be declined without merit review:

- More than one application is received with the same individual identified as the Center Director,
- Or
- More than one application is received with the same institution identified as the Lead Institution.

## **Section IV – APPLICATION AND SUBMISSION INFORMATION**

### **A. ADDRESS TO REQUEST APPLICATION PACKAGE**

Application forms and instructions are available at Grants.gov. To access these materials, go to <https://www.grants.gov>, select “Apply for Grants”, and then select “Download Application Package.” Enter the CFDA number (81.049) and/or the FOA number (DE-FOA-0002253) shown on the cover of this FOA and then follow the prompts to download the application package.

Applications submitted through [www.FedConnect.net](http://www.FedConnect.net) will not be accepted.

### **B. LETTER OF INTENT AND PRE-APPLICATION**

#### **1. Letter of Intent**

A Letter of Intent is not required or invited.

#### **2. Pre-application**

PRE-APPLICATION DUE DATE

February 10, 2020 at 5:00 PM Eastern Time

ENCOURAGE/DISCOURAGE DATE

March 10, 2020

A pre-application is required and must be submitted by February 10, 2020 at 5:00 PM Eastern Time. A pre-application is considered submitted when it is received by the PAMS system. **Only one pre-application may be submitted for the entire Center by the Center Director.**

Pre-applications will be reviewed for responsiveness of the proposed work to the research topics identified in this FOA and for competitiveness. DOE will send a response by email to each applicant encouraging or discouraging the submission of a full application by March 10, 2020. Applicants who have not received a response regarding the status of their pre-application by this date are responsible for contacting the program to confirm this status.

**Only those applicants that receive notification from DOE encouraging a full application may submit full applications.** No other full applications will be considered.

In addition, the Lead Institution identified in the full application must be the same Lead Institution identified in the pre-application. **If an application is received for which the Lead Institution has changed since submission of the pre-application, the application will be deemed non-responsive and will be rejected without further review.** The Lead PI (Center Director) should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to other

senior/key personnel and other participating institutions, although DOE discourages extensive changes.

The pre-application should include a cover page with the following information:

- Pre-application Title (this is the Center Name)
- Lead Organization
- Lead Principal Investigator Name, Job Title (this is the Center Director)
- Lead Principal Investigator Phone Number and Email Address
- Funding Opportunity Announcement Number: DE-FOA-0002253

**This cover page must be signed by an official of the lead organization who has the authority to commit institutional/entity support for the application and by the proposed Center Director.** For DOE National Laboratory contractor applicants, the institutional/entity official who signs the cover page should be the Laboratory Director. For other applicants, the official who signs the cover page should be someone who has authority over research activities for the entire institution/entity, such as the Vice President for Research, Chief Technology Officer, or the equivalent. **All applicants must provide both of these signatures on the pre-application.** Applicants that fail to provide both signatures on the pre-application must provide a corrected pre-application with both signatures on or before February 17, 2020 in order for their pre-application to be considered. No other changes may be made to the pre-application after the February 10, 2020, due date.

The cover page should be followed by a description of the mission, goals, and scientific approaches of the proposed Center, including at least the following elements:

- A clear and concise statement of the mission and scope of the proposed Center and a set of integrated five-year scientific and technological goals designed to support that mission;
- Justification for the Center-scale investment as an integrated, synergistic whole;
- A description of the R&D methods and approaches that will be used to achieve the goals of the Center, and the metrics that will assess the Center's impact and accomplishments;
- An explanation of the importance of the proposed research and development and its potential national scientific, technological, and competitiveness impact;
- A discussion of how the proposed Center is responsive to the objectives of this FOA. Specifically, to be responsive the proposed Center must satisfy the following:
  - Assemble a large, multi-institutional, multi-disciplinary effort with a domestic organization designated as the Lead Institution
  - Incorporate each of the five Essential Components as described in Section I
  - Address and integrate at least three levels of the QIS S&T Innovation Chain
  - Include Fundamental Science as one of the levels of the Chain that it addresses
  - Integrate sub-topics from at least two of the Technical Areas of Interest as described in Section I

This description of the proposed Center may not exceed **five pages**, with a minimum text font size of Times New Roman 12 point and margins no smaller than one inch on all sides. Figures and references, if included, must fit within the five-page limit.

The pre-application must include the following two Tables and addenda, if applicable, which will not count toward the five-page limit:

**Table 1: Center Members (Center Director, Deputy Center Director, Leads for Major Thrust Areas, PI’s and Senior/Key Personnel) on the pre-application and institutional affiliations**

Center Members			Institution
Last Name	First Name	Title	Institution Name

Identify any non-domestic institutions in Table 1 and provide an addendum for each non-domestic institution demonstrating how the non-domestic institution possesses skills, resources, and abilities that do not exist among potential domestic institutions.

**Table 2: Collaborators of Center Members**

Collaborator			Institution
Last Name	First Name	Title	Institution Name

For all Center members, Table 2 must include collaborative co-investigators including co-authors of the past 48 months, co-editors of the past 24 months, graduate and postdoctoral advisors/advisees, and close associations.

**Table 2 should exclude all personnel at any of the institutions listed in Table 1.**

**PRE-APPLICATION REVIEW**

Federal Program Managers may evaluate all or some portion of pre-applications to determine their responsiveness and competitiveness within a scientific topic.

Any pre-application review will be based on the following criteria:

1. Responsiveness to the objectives of the FOA.
2. Scientific and technical merit.
3. Appropriateness of the proposed research approaches.
4. Likelihood of scientific impact.

Any such pre-application review will be conducted by no less than three federal program managers chosen for their topical knowledge and diversity of perspective.

Each pre-application will be reviewed on its own merit. Priority will be given to scientifically innovative and forward-looking basic research with the highest likelihood of success as an application. Applicants with the highest rated pre-applications will be encouraged to submit applications; others will be discouraged from submitting applications. Applicants who are discouraged from submitting full applications may request feedback from the review, which will be provided after awards have been announced. The results of the review will be documented.

The following pre-applications will be deemed unresponsive:

- Pre-applications from single institutions
- Pre-applications from non-domestic Lead Institutions
- Pre-applications that do not incorporate each of the five Essential Components
- Pre-applications that do not address and integrate at least three levels of the QIS S&T Innovation Chain
- Pre-applications that do not include fundamental science as one of the levels of the QIS S&T Innovation Chain that they address
- Pre-applications that do not integrate sub-topics from at least two of the Technical Areas of Interest.

SC is committed to ensuring that a sufficient number of applicants will be encouraged to submit applications to foster a competitive merit review of the applications. SC's intent in discouraging submission of certain applications is to save the time and effort of applicants in preparing and submitting applications with a negligible likelihood of success.

The PI will be automatically notified when the pre-application is encouraged or discouraged. The DOE SC Portfolio Analysis and Management System (PAMS) will send an email to the PI from [PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov), and the status of the pre-application will be updated at the PAMS website <https://pamspublic.science.energy.gov/>. Notifications are sent as soon as the decisions to encourage or discourage are finalized.

#### PRE-APPLICATION SUBMISSION

It is important that the pre-application be a single file with extension .pdf, .docx, or .doc. The filename must not exceed 50 characters. The pre-application must be submitted electronically through the DOE SC Portfolio Analysis and Management System (PAMS) website <https://pamspublic.science.energy.gov/>. The PI and anyone submitting on behalf of the PI must register for an account in PAMS before it will be possible to submit a pre-application. All PIs and those submitting pre-applications on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Please see [Section IV, Part I, 4., DOE SC Portfolio Analysis and Management System \(PAMS\), below](#), for instructions about how to register in PAMS.

### Submit Your Pre-Application:

- Create your pre-application (called a preproposal in PAMS) outside the system and save it as a file with extension .docx, .doc, or .pdf. Make a note of the location of the file on your computer so you can browse for it later from within PAMS.
- Log into PAMS and click the Proposals tab. Click the “View / Respond to Funding Opportunity Announcements” link and find the current announcement in the list. Click the “Actions/Views” link in the Options column next to this announcement to obtain a dropdown menu. Select “Submit Preproposal” from the dropdown.
- On the Submit Preproposal page, select the institution from which you are submitting this preproposal from the Institution dropdown. If you are associated with only one institution in the system, there will only be one institution in the dropdown.
- Note that you must select one and only one PI per preproposal; to do so, click the “Select PI” button on the far right side of the screen. Find the appropriate PI from the list of all registered users from your institution returned by PAMS. (Hint: You may have to sort, filter, or search through the list if it has multiple pages.) Click the “Actions” link in the Options column next to the appropriate PI to obtain a dropdown menu. From the dropdown, choose “Select PI.”
- If the PI for whom you are submitting does not appear on the list, it means he or she has not yet registered in PAMS. For your convenience, you may have PAMS send an email invitation to the PI to register in PAMS. To do so, click the “Invite PI” link at the top left of the “Select PI” screen. You can enter an optional personal message to the PI in the “Comments” box, and it will be included in the email sent by PAMS to the PI. You must wait until the PI registers before you can submit the preproposal. Save the preproposal for later work by clicking the “Save” button at the bottom of the screen. It will be stored in “My Preproposals” for later editing.
- Enter a title for your preproposal.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the preproposal file into PAMS, click the “Attach File” button at the far right side of the screen. Click the “Browse” (or “Choose File” depending on your browser) button to search for your file. You may enter an optional description of the file you are attaching. Click the “Upload” button to upload the file.
- At the bottom of the screen, click the “Submit to DOE” button to save and submit the preproposal to DOE.
- Upon submission, the PI will receive an email from the PAMS system <[PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov)> acknowledging receipt of the preproposal.

You are encouraged to register for an account in PAMS at least a week in advance of the preproposal submission deadline so that there will be no delays with your submission.

**WARNING:** The PAMS website at <https://pampspublic.science.energy.gov> will permit you to edit a previously submitted pre-application in the time between your submission

and the deadline. If you choose to edit, doing so will remove your previously submitted version from consideration. If you are still editing at the time of the deadline, you will not have a valid submission. Please pay attention to the deadline.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this FOA should reference DE-FOA-0002253.

Pre-applications submitted outside PAMS will not be considered. Pre-applications may not be submitted through Grants.gov or www.FedConnect.net.

### **C. GRANTS.GOV APPLICATION SUBMISSION AND RECEIPT PROCEDURES**

This section provides the application submission and receipt instructions for full applications to SC, for those applicants whose pre-applications have resulted in notification from DOE encouraging a full application. Please read the following instructions carefully and completely.

#### **1. Electronic Delivery**

SC is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. SC requires applicants to submit their applications online through Grants.gov.

#### **2. How to Register to Apply through Grants.gov**

a. Instructions: Read the instructions below about registering to apply for SC funds. Applicants should read the registration instructions carefully and prepare the information requested before beginning the registration process. Reviewing and assembling the required information before beginning the registration process will alleviate last-minute searches for required information.

Organizations must have a Data Universal Numbering System (DUNS) Number, active System for Award Management (SAM) registration, and Grants.gov account to apply for grants. If individual applicants are eligible to apply for this FOA, then you may begin with step 3, Create a Grants.gov Account, listed below.

Creating a Grants.gov account can be completed online in minutes, but DUNS and SAM registrations may take several weeks. Therefore, an organization’s registration should be done in sufficient time to ensure it does not impact the entity’s ability to meet required application submission deadlines.

Complete organization registration instructions can be found on Grants.gov here: <https://www.grants.gov/web/grants/applicants/organization-registration.html>

1) Obtain a DUNS Number: All entities applying for funding, including renewal funding, must have a DUNS Number from Dun & Bradstreet (D&B). Applicants must enter the DUNS Number in the data entry field labeled “Organizational DUNS” on the SF-424 form. For more detailed instructions for obtaining a DUNS Number, refer to:

<https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html>

2) *Register with SAM*: All organizations applying online through Grants.gov must register with SAM at <https://www.sam.gov/>. Failure to register with SAM will prevent your organization from applying through Grants.gov. SAM registration must be renewed annually. For more detailed instructions for registering with SAM, refer to:

<https://www.grants.gov/web/grants/applicants/organization-registration/step-2-register-with-sam.html>

3) *Create a Grants.gov Account*: The next step is to register an account with Grants.gov. Follow the on-screen instructions or refer to the detailed instructions here:

<https://www.grants.gov/web/grants/applicants/registration.html>

4) *Add a Profile to a Grants.gov Account*: A profile in Grants.gov corresponds to a single applicant organization the user represents (i.e., an applicant) or an individual applicant. If you work for or consult with multiple organizations and have a profile for each, you may log in to one Grants.gov account to access all of your grant applications. To add an organizational profile to your Grants.gov account, enter the DUNS Number for the organization in the DUNS field while adding a profile. For more detailed instructions about creating a profile on Grants.gov, refer to:

<https://www.grants.gov/web/grants/applicants/registration/add-profile.html>

5) *EBiz POC Authorized Profile Roles*: After you register with Grants.gov and create an Organization Applicant Profile, the organization applicant’s request for Grants.gov roles and access is sent to the Electronic Business Point of Contact (EBiz POC). The EBiz POC will then log in to Grants.gov and authorize the appropriate roles, which may include the Authorized Organizational Representative (AOR) role, thereby giving you permission to complete and submit applications on behalf of the organization. You will be able to submit your application online any time after you have been assigned the AOR role. For more detailed instructions about creating a profile on Grants.gov, refer to:

<https://www.grants.gov/web/grants/applicants/registration/authorize-roles.html>

6) *Track Role Status*: To track your role request, refer to:

<https://www.grants.gov/web/grants/applicants/registration/track-role-status.html>

b. *Electronic Signature*: When applications are submitted through Grants.gov, the name of the organization applicant with the AOR role that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC **must** authorize people who are able to make legally binding commitments on behalf of the organization as a user with the AOR role; **this step is often missed and it is crucial for valid and timely submissions.**

### 3. How to Submit an Application to SC via Grants.gov

Grants.gov applicants can apply online using Workspace. Workspace is a shared, online environment where members of a grant team may simultaneously access and edit different webforms within an application. For each FOA, you can create individual instances of a workspace.

Below is an overview of applying on Grants.gov. For access to complete instructions on how to apply for opportunities, refer to:

<https://www.grants.gov/web/grants/applicants/apply-for-grants.html>

1) Create a Workspace: Creating a workspace allows you to complete it online and route it through your organization for review before submitting.

2) Complete a Workspace: Add participants to the workspace, complete all the required forms, and check for errors before submission.

a. Adobe Reader: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace so that they will appear similar to other Standard forms. The individual PDF forms can be downloaded and saved to your local device storage, network drive(s), or external drives, then accessed through Adobe Reader.

NOTE: Visit the Adobe Software Compatibility page on Grants.gov to download the appropriate version of the software at:

<https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html>

b. Mandatory Fields in Forms: In the forms, you will note fields marked with an asterisk and a different background color. These fields are mandatory fields that must be completed to successfully submit your application.

c. Complete SF-424 Fields First: The forms are designed to fill in common required fields across other forms, such as the applicant name, address, and DUNS number. To trigger this feature, an applicant must complete the SF-424 information first. Once it is completed, the information will transfer to the other forms.

3) Submit a Workspace: An application may be submitted through workspace by clicking the Sign and Submit button on the Manage Workspace page, under the Forms tab. Grants.gov recommends submitting your application package at least 24-48 hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the application submission.

4) Track a Workspace: After successfully submitting a workspace package, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the package. The number will be listed on the Confirmation page that is generated after submission.

For additional training resources, including video tutorials, refer to:  
<https://www.grants.gov/web/grants/applicants/applicant-training.html>

Applicant Support: Grants.gov provides applicants 24/7 support via the toll-free number 1-800-518-4726 and email at [support@grants.gov](mailto:support@grants.gov). For questions related to the specific grant opportunity, contact the number listed in the application package of the grant you are applying for.

If you are experiencing difficulties with your submission, it is best to call the Grants.gov Support Center and get a ticket number. The Support Center ticket number will assist SC with tracking your issue and understanding background information on the issue.

#### **4. Timely Receipt Requirements and Proof of Timely Submission**

Proof of timely submission is automatically recorded by Grants.gov. An electronic date/time stamp is generated within the system when the application is successfully received by Grants.gov. The applicant AOR will receive an acknowledgement of receipt and a tracking number (GRANTXXXXXXXX) from Grants.gov with the successful transmission of their application. Applicant AORs will also receive the official date/time stamp and Grants.gov Tracking number in an email serving as proof of their timely submission.

When SC successfully retrieves the application from Grants.gov, and acknowledges the download of submissions, Grants.gov will provide an electronic acknowledgment of receipt of the application to the email address of the applicant with the AOR role. Again, proof of timely submission shall be the official date and time that Grants.gov receives your application. Applications received by Grants.gov after the established due date for the program will be considered late and will not be considered for funding by SC.

Applicants using slow internet, such as dial-up connections, should be aware that transmission can take some time before Grants.gov receives your application. Again, Grants.gov will provide either an error or a successfully received transmission in the form of an email sent to the applicant with the AOR role. The Grants.gov Support Center reports that some applicants end the transmission because they think that nothing is occurring during the transmission process. Please be patient and give the system time to process the application.

#### **D. CONTENT AND APPLICATION FORMS**

##### **APPLICATION PREPARATION**

Applicants are advised to ensure that the project narrative and requested appendices adequately address the merit review criteria considerations provided in Section V.2., Merit Review Criteria, to facilitate the review of the application.

You must submit the application through Grants.gov at <https://www.grants.gov/>, using either the online webforms or downloaded forms. (Additional instructions are provided in [Section IV, Part C](#) of this FOA.)

You are required to use the compatible version of Adobe Reader software to complete a [Grants.gov](https://www.grants.gov) Adobe application package. To ensure you have the [Grants.gov](https://www.grants.gov) compatible version of Adobe Reader, visit the software compatibility page at <https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html>.

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 PDF files unless otherwise specified in this FOA. Attached PDF files must be plain files consisting of text, numbers, and images without editable fields, signatures, passwords, redactions, or other advanced features available in some PDF-compatible software. Do not use PDF portfolios or binders.

Please note the following restrictions that apply to the names of all files attached to your application:

- Please limit file names to 50 or fewer characters
- Do not attach any documents with the same name. All attachments must have a unique name.
- Please use only the following characters when naming your attachments: A-Z, a-z, 0-9, underscore, hyphen, space, period, parenthesis, curly braces, square brackets, ampersand, tilde, exclamation point, comma, semi colon, apostrophe, at sign, number sign, dollar sign, percent sign, plus sign, and equal sign. Attachments that do not follow this rule may cause the entire application to be rejected or cause issues during processing.

#### LETTERS

Letters of support are discouraged and will not be reviewed by DOE.

#### RESUBMISSION OF APPLICATIONS

Applications submitted under this FOA may be withdrawn from consideration by using the PAMS website at <https://pamspublic.science.energy.gov>. Applications may be withdrawn at any time between when the applicant submits the application and when DOE makes the application available to merit reviewers. Such withdrawals take effect immediately and cannot be reversed. Please exercise due caution.

After an application is withdrawn, it may be resubmitted, if this FOA is still open for the submission of applications. Such resubmissions will only count as one submission.

Note that there may be a delay between the application's submission in Grants.gov and when it is available to be withdrawn in PAMS. SC will usually consider the last submission, according to its Grants.gov timestamp, to be the intended version. Please consult with your program manager to resolve any confusion about which version of an application should be considered.

## IMPROPER CONTENTS OF APPLICATIONS

Applications submitted under this FOA will be stored in controlled-access systems, but they may be made publicly available if an award is made. As such, it is critical that applicants follow these guidelines:

- Do not include information subject to any legal restriction on its open distribution, whether classified, export control, or unclassified controlled nuclear information.
- Do not include sensitive and protected personally identifiable information, including social security numbers, birthdates, citizenship, marital status, or home addresses. Pay particular attention to the content of biographical sketches and curriculum vitae.
- Do not include letters of support from Federal officials.
- Do not include letters of support on Federal letterhead. Letters that are not letters of support (such as letters confirming access to sites, facilities, equipment, or data; or letters from cognizant Contracting Officers) may be on Federal letterhead.
- Clearly mark all proprietary or trade-secret information.

## DEPARTURE OF CENTER DIRECTOR

If the Center Director ends her or his relationship with the Lead Institution before this FOA closes or while the application is under review, please consult with the DOE program managers to discuss the available options. The application may be withdrawn, or a new Center Director could be proposed.

### 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 is available on the DOE Financial Assistance Forms Page at <https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Certifications and Assurances.

Applicants that have updated or started their registrations in <https://www.SAM.gov> on or after February 2, 2019, will also be bound by their representations and certifications in SAM.gov.

## DUNS AND EIN NUMBERS (FIELDS 5 AND 6 ON THE FORM)

The DUNS and Employer Identification Number (EIN) fields on the SF-424 (R&R) form are used in PAMS to confirm the identity of the individual or organization submitting an application.

- Enter each number as a nine-digit number.
- Do not use hyphens or dashes.
- SC does not use the twelve-digit EIN format required by some other agencies.
- SC does not use the DUNS+4 format.

## TYPE OF APPLICATION (FIELD 8 ON THE FORM)

A **new** application is one in which DOE support for the proposed research is being requested for the first time. Only new applications may be submitted in response to this FOA.

Please answer “yes” to the question “Is this application being submitted to other agencies?” if substantially similar, identical, or closely related research objectives are being submitted to another Federal agency. Indicate the agency or agencies to which the similar objectives have been submitted.

## 2. Research and Related Other Project Information

Complete questions in fields 1 through 6 of the SF-424 Research and Related Other Project Information form.

### Note concerning question 4.a. and 4.b.

If any environmental impact, positive or negative, is anticipated, indicate “yes” in response to question 4.a., “potential impact – positive or negative - on the environment.” Disclosure of the impact should be provided in response to question 4.b. First indicate whether the impact is positive or negative and then identify the area of concern (e.g., air, water, exposure to radiation, etc.). Should the applicant have any uncertainty, they should check “yes.”

DOE understands the phrase in field 4.a., “potential impact ... negative” to apply if the work described in the application could potentially have any of the impacts listed in (1) through (5) of 10 CFR 1021, Appendix B, Conditions that Are Integral Elements of the Classes of Action in Appendix B. (<http://www.ecfr.gov>)

Additionally, for actions which could have any other adverse impacts to the environment or have any possibility for adverse impacts to human health (e.g., use of human subjects, Biosafety Level 3-4 laboratory construction/operation, manufacture or use of certain nanoscale materials which are known to impact human health, or any activities involving transuranic or high level radioactive waste, or use of or exposure to any radioactive materials beyond de minimis levels), applicants should indicate a “negative” impact on the environment.

Lastly, 1) if there would be extraordinary circumstances (i.e., scientific or public controversy) related to the significance of environmental effects (10 CFR 1021.410 (b)(2)), 2) if the work is connected to other actions with potentially significant impacts (10 CFR 1021.410 (b)(3)), or 3) if the work is related to other nearby actions with the potential for cumulatively significant impacts (10 CFR 1021.410 (b)(3)), applicants should indicate a “negative” impact on the environment.

The bulk of your application will consist of files attached to the Research and Related Other Project Information form. The files must comply with the following instructions:

PROJECT SUMMARY/ABSTRACT (FIELD 7 ON THE FORM)

The project summary/abstract is a summary of the proposed activity suitable for distribution to the public and sufficient to permit potential reviewers to identify conflicts of interest. It must be a self-contained document. Provide the name of the applicant (lead institution), the project title (Center Name), the Lead PI (Center Director) and the Lead PI's institutional affiliation, any coinvestigators and their institutional affiliations, the objectives of the project, a description of the project, including methods to be employed, and the potential impact of the project (i.e., benefits, outcomes). A sample is provided below:

<p>A Really Great Idea</p> <p>A. Smith, Lead Institution (Principal Investigator) A. Brown, Institution 2 (Co-Investigator) A. Jones, Institution 3 (Co-Investigator)</p> <p>Text of abstract</p>
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The project summary must not exceed 1 page when printed using standard 8.5” by 11” paper with 1” margins (top, bottom, left and right) with font not smaller than Times New Roman 12 point. To attach a Project Summary/Abstract, click “Add Attachment.”

If an application is recommended for award, the project summary will be used in preparing a public abstract about the award. Award abstracts and titles form a Government document that describes the project and justifies the expenditure of Federal funds in light of the DOE and SC mission statements at <https://energy.gov/mission> and <https://science.energy.gov/about/>.

- Do not include any proprietary or sensitive business information.
- DOE may use the abstract to prepare public reports about supported research.

DOE COVER PAGE

(PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

The application narrative must begin with a cover page that will not count toward the project narrative page limitation. The cover page must include the following items:

- The project title (Center Name) [This should match or closely match the project title in the pre-application]
- Lead Applicant/Institution: [This must match the pre-application]
- Street Address/City/State/Zip:
- Postal Address:

- Lead PI (Center Director) name, title, telephone number, email: [Lead PI must match the Lead PI identified in the pre-application, unless a change was unavoidable]
- Lead Institution Administrative Point of Contact name, telephone number, email:
- FOA Number: DE-FOA-0002253
- DOE/SC Program Office: Advanced Scientific Computing Research
- DOE/SC Program Office Technical Contact: Dr. Ceren Susut
- PAMS pre-application (preproposal) tracking number:

The lead institution must be the same lead institution as identified in the required pre-application. **If an application is received for which the Lead Institution has changed since submission of the pre-application, then the application will be rejected without further review. If an application is received that is associated with a pre-application for which submission of a full application was discouraged, then the application will be rejected without further review.** The Lead PI (Center Director) should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to the other senior/key personnel and other participating institutions, although DOE discourages extensive changes.

On separate pages, as a supplement to the cover page, include the following four tables providing personnel and budget information for the entire project (including all institutions). Note Tables 1 & 2 are the same (possibly updated) as those submitted in the pre-application.

**Table 1: Center Members (Center Director, Deputy Center Director, Leads for Major Thrust Areas PI’s and Senior/Key Personnel) on the application and institutional affiliations**

Center Members			Institution
Last Name	First Name	Title	Institution Name

Identify any non-domestic institutions in Table 1 and provide an addendum for each non-domestic institution demonstrating how the non-domestic institution possesses skills, resources, and abilities that do not exist among potential domestic institutions. **If an application is received in which non-domestic participation is proposed but is not identified in Table 1 or a justification for non-domestic participation is not provided via an addendum to Table 1, the application will be deemed non-responsive and rejected without further review.**

**Table 2: Collaborators of Center Members**

Collaborator			Institution
Last Name	First Name	Title	Institution Name

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For all Center members, Table 2 must include co-authors over the past 48 months, graduate and postdoctoral advisors, graduate students and postdoctoral associates that have been supervised during the past 60 months, and any other current close associations.

**Table 2 should exclude all personnel at any of the institutions listed in Table 1.**

**Table 3: Summary Budget Information by Institution (\$ in thousands)**

Institution Name	Center PI Last Name	Center PI First Name	Year1 Budget (\$K)	Year2 Budget (\$K)	Year3 Budget (\$K)	Year4 Budget (\$K)	Year5 Budget (\$K)	Total Budget (\$K)
<b>Total Budget</b>								

Provide the total costs (\$ in thousands) of the budget request in each year for each institution and totals for all rows and columns. For any for-profit entities, whether prime recipients (lead organizations) or subawardees (team members), for which cost sharing is required in accordance with Section III. B, include 2 separate lines: the first for the proposed DOE-funded budget amount and the second for proposed cost-share amount. The sum of all lines should equal the “Total Budget” amount.

**\*\*Notice for Tables 1, 2 and 3:** Applicants should follow the exact format of the sample tables for Tables 1, 2 and 3 because the tabular information will be compiled across all applications. This includes the elements listed below, as applicable to each table. For purposes of uniformity, Excel templates are provided through Grants.gov (“Related Documents” tab on the FOA page) and should be used in preparing these 3 tables, before converting to PDF for inclusion in the application, as described above. These templates mirror the content and format of the sample tables provided above. **The applicant should also submit the original Excel files that were used to create the tables via email to QISCenters.FOA@science.doe.gov no later than April 10, 2020 at 5 PM Eastern Time. The subject line of the email should read “Centers App Tables:” followed by the Center Director’s last name and the lead institution’s name, e.g. “Centers App Tables: Jones, University of XYZ”.**

- Do not merge name or institution cells, even if individuals share the same institution.
- Do not change the order of the columns.
- Do not include any additional information (e.g. “PI”, “Co-PI”, or footnote symbols) under “Last Name” and “First Name”.
- Do not include departmental affiliations under Institutions.

- If an individual has a joint appointment, separate the institutions with a “/” (i.e. “Univ of X / National Lab Y”).

**Table 4: Summary Budget Information by Major Thrust Area (\$ in thousands)**

Major Thrust Area	Lead for Major Thrust Area	Year1 Budget	Year2 Budget	Year3 Budget	Year4 Budget	Year5 Budget	Total Budget
<b>Total</b>							

Tables 1- 4 will not count in the application page limitation.

**Important Instructions to the Sponsored Research Office of Submitting Institutions:** SC requires that you create one single PDF file that contains the DOE Cover Page, project narrative, biographical sketch, current and pending support, bibliography and references cited, facilities and other resources, equipment, data management plan, and other attachments. This single PDF file must be attached in Field 8 on the Grants.gov form. Do not attach any of the items listed in this paragraph separately in any other field in Grants.gov. If you do, these additional attachments will not become part of the application in PAMS.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The project narrative **must not exceed 30 pages** of technical information, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right). The font must not be smaller than Times New Roman 12 point. **If the Project Narrative exceeds 30 pages, only the first 30 pages will be reviewed or considered.** This page limit does not apply to the Cover Page, any Table of Contents (optional, but if included should be limited to one page), Budget Page(s), Budget Justification, biographical material, publications and references, and appendices, each of which may have its own page limit. Headers/footers containing page numbers and project titles/logos may be inserted within the required 1” margins.

Do not include any Internet addresses (URLs) that provide supplementary or additional information that constitutes a part of the application. Merit reviewers are not required to access Internet sites; however, Internet publications in a list of references will be treated identically to print publications. See [Section VIII, Part D](#) for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

All Project Narratives must, at least, include an overview of the Center that provides a concise summary of the vision and a section for each of the five essential components as described in Section I. These sections should contain background material, specific objectives, methods to be used, and metrics to evaluate the Center's impact. The five essential components that must be incorporated in each Center are:

- S&T Innovation Chain and Co-Design
- Technical Areas of Interest – topics and sub-topics
- QIS Ecosystem Stewardship
- Management Structure (A brief overview of the data management plan and the IP plan should be included here however the details should be addressed in Appendices 6 and 10, respectively.)
- Instrumentation and Facilities (A brief overview of the plan for using, developing and accessing instrumentation, facilities and related capabilities should be included here however details about specific resources should be addressed in Appendices 4, 5 and 11.)

**Do not attach any of the requested appendices described below as files for fields 9, 10, 11, and 12 in Grants.gov. Follow the below instructions to include the information as appendices in the single, bundled project narrative file. The information provided in the appendices will not count toward the Project Narrative page limitation identified above.**

#### APPENDIX 1: BIOGRAPHICAL SKETCH

Provide a biographical sketch for the Center Director, Deputy Center Director, Leads for Major Thrust Areas, all PIs, and each additional senior/key person listed in Section A on the R&R Budget form, or proposed as a subawardee or consultant, if they meet the definition of a senior/key personnel (see Section IX).

As part of the sketch, provide information that can be used by reviewers to evaluate the person's potential for leadership within the scientific community. Examples of information of interest are invited and/or public lectures, awards received, scientific program committees, conference or workshop organization, professional society activities, special international or industrial partnerships, reviewing or editorship activities, or other scientific leadership experiences.

- Provide the biographical sketch information as an appendix to your project narrative.
- Do not attach a separate file.
- The biographical sketch appendix will not count in the project narrative page limitation.
- The biographical information (curriculum vitae) for each person must not exceed 3 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than Times New Roman 12 point.

SC does not require a particular format for a biosketch. Applicants may use a format developed for other agencies or generated by any software package, including SciENCv, a cooperative venture maintained at <https://www.ncbi.nlm.nih.gov/sciencv/>. The biographical information (curriculum vitae) must include the following items within its page limit:

- **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. Patents, copyrights and software systems developed may be provided in addition to or substituted for publications. An abbreviated style such as the Physical Review Letters (PRL) convention for citations (list only the first author) may be used for publications with more than 10 authors.
- **Synergistic Activities:** List no more than 5 professional and scholarly activities related to the effort proposed.

In addition, the biographical sketch must include information to permit DOE to identify individuals who are conflicted with or potentially biased (favorably or unfavorably) for or against the investigator. Include a section entitled “**Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers**” that will not count in a page limit. Provide the following information in this section:

- **Collaborators and Co-editors:** List in alphabetical order all persons **outside of your home institution**, 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. For publications or collaborations with more than 10 authors or participants, only list those individuals in the core group with whom you interacted on a regular basis while the research was being done. 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). Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates whom you have supervised during the past five years.

**Center Director Statement of Employment:** Documentation must be submitted providing evidence that the proposed Center Director is an employee or will become an employee of the prime applicant upon award of a Center. The statement of employment is limited to one page and must be signed by both the Center Director and an authorized representative of the lead institution. This document is not included in the 3-page limit for each biographical sketch.

**Individual Letters of Commitment:** For each senior/key person, including the Center Director

and Principal Investigator(s), provide a current signed and dated letter of commitment that confirms their intent to participate on this project, including their individual level of time commitment, for a minimum period of five years. Multiple personnel representing the same institution may sign the same letter of commitment, as applicable. This letter of commitment is limited to one page and is not included in the 3-page limit for each biographical sketch.

**Protected Personally Identifiable Information:** Do not include sensitive and protected personally identifiable information including social security numbers, birthdates, citizenship, marital status, or home addresses. Do not include information that a merit reviewer should not make use of.

#### APPENDIX 2: CURRENT AND PENDING SUPPORT

Provide a list of all current and pending support (both Federal and non-Federal, foreign and domestic) for the PI and senior/key persons, including subawardees, for ongoing projects and pending applications. List all sponsored activities or awards requiring a measurable commitment of effort, whether paid or unpaid. SC does not require a particular format for current and pending support. Applicants may use a format developed for other agencies or generated by any software package, including SciENcv, a cooperative venture maintained at <https://www.ncbi.nlm.nih.gov/sciencv/>.

For every activity, list the following items:

- The sponsor of the activity or the source of funding
- The award or other identifying number
- The title of the award or activity
- The total cost or value of the award or activity, including direct and indirect costs. For pending proposals, provide the total amount of requested funding.
- The award period (start date – end date).
- The person-months of effort per year being dedicated to the award or activity
- Briefly describe the research being performed and explicitly identify any overlaps or synergies with the proposed research.

Provide the Current and Pending Support as Appendix 2 to your project narrative within the same file. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 3: BIBLIOGRAPHY & REFERENCES CITED

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication.

For research areas where there are routinely more than ten coauthors of archival publications, you may use an abbreviated style such as the Physical Review Letters (PRL) convention for citations (listing only the first author). For example, your paper may be listed as, “A Really Important New Result,” A. Aardvark et. al. (MONGO Collaboration), PRL 999. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. Provide the Bibliography and References Cited information as Appendix 3 to your project narrative within the same file.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 4: FACILITIES & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). 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. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. For proposed investigations requiring access to experimental user facilities maintained by institutions other than the applicant, please provide a document from the facility manager confirming that the researchers will have access to the facility. Please provide the Facility and Other Resource information as Appendix 4 to your project narrative within the same file.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 5: EQUIPMENT

List major items of equipment already available for this project and, if appropriate, identify location and pertinent capabilities. Provide the Equipment information as Appendix 5 to your project narrative within the same file.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 6: DATA MANAGEMENT PLAN

Provide a Data Management Plan (DMP) that addresses the following requirements:

1. DMPs should describe whether and how data generated in the course of the proposed research will be shared and preserved. If the plan is not to share and/or preserve certain data, then the plan must explain the basis of the decision (for example, cost/benefit considerations,

other parameters of feasibility, scientific appropriateness, or limitations discussed in #4). At a minimum, DMPs must describe how data sharing and preservation will enable validation of results, or how results could be validated if data are not shared or preserved.

2. DMPs should provide a plan for making all research data displayed in publications resulting from the proposed research open, machine-readable, and digitally accessible to the public 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 to the public in accordance with the principles stated in the SC Statement on Digital Data Management (<https://science.osti.gov/Funding-Opportunities/Digital-Data-Management>). 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.
3. DMPs should describe how a public-facing Center web-site will be developed and maintained.
4. DMPs should consult and reference available information about data management resources to be used in the course of the proposed research. In particular, DMPs that explicitly or implicitly commit 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 SC 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 SC facilities can be found in the additional guidance from the sponsoring program.
5. DMPs must protect confidentiality, personal privacy, Protected 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 applicable laws, and regulations. There is no requirement to share proprietary data.

DMPs will be reviewed as part of the overall SC research proposal merit review process. Applicants are encouraged to consult the SC website for further information and suggestions for how to structure a DMP: <https://science.osti.gov/Funding-Opportunities/Digital-Data-Management>

- This appendix should not exceed 3 pages including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right).
- Provide the Data Management Plan as Appendix 6 to your project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 7: STATEMENT OF CONFLICT OF INTEREST

At the time of submission, the applicant shall include information identifying potential, apparent, or actual organizational and individual conflicts of interest and proposed mitigation. This shall include the applicant, their team members, and senior/key personnel named in the application.

Negative responses are also required. Prior to award, DOE reserves the right to require the submission of a Conflict of Interest Management Plan describing the applicant's approach to managing conflicts of interest.

- Provide the Statement(s) of Conflict of Interest as Appendix 7 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 8: ORGANIZATIONAL LETTERS OF COMMITMENT

A single organizational letter of commitment is required from each organization participating as a Center member. Each organizational letter of commitment is limited to one page and must be current, signed, and dated by a person authorized to commit the participating organization to a legally binding agreement for this project.

- Provide Organizational Letters of Commitment as Appendix 8 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 9: ENVIRONMENT, SAFETY AND HEALTH (ES&H), QUALITY ASSURANCE, AND SECURITY APPROACHES

Applicants should provide information on the approach for handling environment, safety and health, quality assurance, and security issues and assuring environmental compliance during Center establishment and research and development activities; procedures for ensuring security, including access to data stored on Center computers; the ES&H compliance history of the lead and team member organizations over the last five years (e.g., EPA and state environmental notices of violation, OSHA citations, status of any resulting action plans); and any anticipated environmental permit requirements, including NEPA, for the proposed Center and proposed schedule for environmental permits and NEPA requirements.

- Provide the Environment, Safety, and Health and Security Approaches as Appendix 9 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 10: INTELLECTUAL PROPERTY (IP) MANAGEMENT PLAN

Each Center should include within their application a proposed IP Management Plan that ensures and facilitates compliance with Federal IP laws and policies, the public interest regarding dissemination of scientific reports/results, and the rapid transfer of technology in the topical area of the Center.

Unless the applicant requests a Technology Investment Agreement (TIA), the statutes and policies governing disposition of title to new inventions under Government agreements will be as follows:

- i. The Bayh-Dole Act, 35 U.S.C. 200 et seq., requires that universities, nonprofits and small businesses who are participating under a funding agreement will have the option to retain title to their own employees' inventions.
- ii. The Federal Non Nuclear Energy Act of 1974, 42 U.S.C. 5908, will govern disposition of title for all other parties, regardless of whether they receive Government funding and requires that the Government obtains title to new inventions unless a waiver is granted. DOE regulations at 10 CFR Part 784 address the factors that are considered in the granting of waivers, including whether the waiver is needed to secure participation, private investment being made or likely to be made, the commercial position of the waiver requestor, etc.
- iii. Inventions made by employees of an FFRDC will be subject to the M&O contract terms and conditions with respect to ownership of inventions made by lab employees.

This FOA allows applicants to request a TIA. In a TIA, the intellectual property rights are not subject to the requirements of the Bayh-Dole Act or 42 U.S.C. 5908 and are negotiable. If the applicant requests a TIA and DOE determines it is appropriate to award a TIA, patent rights will be negotiated pursuant to the guidance set forth in 10 CFR Parts 603.840 through 603.875.

The plan should also describe how the Center will share data and other software tools to create an innovative ecosystem within the Center and with external stakeholders. The plan should address title to inventions and other IP among the Center members and should at minimum cover:

- Sharing of information and treatment of confidential information among the Center and Center members (e.g., the use of NDAs);
- The treatment of background intellectual property (e.g., any requirements for identifying it or making it available);
- The treatment of Technical Areas of Interest as set forth in Section 1 of this FOA, ensuring that Center members have sufficient intellectual property rights to further develop and bring the technologies to market.
- The treatment of inventions made under the award (e.g., any requirements for disclosing to the other members, attribution on patent applications, filing patent applications, paying for patent prosecution, and cross-licensing or other licensing arrangements between the members);
- The treatment of data produced, including software, under the award (e.g., any publication process or other dissemination strategies, copyrighting strategy or licensing arrangement among members);
- Any technology transfer and commercialization requirements or arrangements among the members;
- The treatment of any intellectual property issues that may arise due to a change in Center membership; and
- The handling of disputes related to intellectual property between members.
- Provide the IP Management Plan as Appendix 10 to the project narrative within the same

file. Do not attach a separate file.

- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 11: QIS CENTER INFRASTRUCTURE PLAN

Discuss the plans for locating the proposed Center. This includes identification of the site or sites where the major activities of the Center will take place and how the site(s) will be acquired (use of space provided by the host institution(s), leased space, or combinations of these and other options) and prepared for use by the Center. The Center site, acquisition, design and development plan should describe the proposed size, conceptual layout, and development strategy (including summary-level scope, schedule and cost estimates including alteration and/or renovations for the space, i.e., the estimated cost to build out the space) for the space needed to house and support the research program identified in the narrative.

- Provide the QIS Center Infrastructure Plan as Appendix 11 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 12: ADDITIONAL INSTITUTIONAL COMMITMENT

Discuss any additional contributions to the proposed Center, and the source of the contributions, institutional or third party, foreign or domestic, including, but not limited to:

- The provision of space, facilities, equipment, or resources at no or reduced charge;
- The provision of release time for faculty;
- The provision of scholarship support for students; or
- The waiver of facilities and administrative costs, in whole or in part.
- Third party contributions (e.g., state, private entities, etc.)

Institutional commitments may not include the following:

- Revenues or royalties from the prospective operation of an activity beyond the time considered in the award;
- Proceeds from the prospective sale of an asset of an activity; or
- Other Federal awards.

You must provide a letter from the institution stating that it is committed to providing a specific contribution. The letter should also identify the proposed type of contribution. Letters must be signed by a person authorized to commit the organization to the contribution and are limited to one-page. Each institution should provide one letter that lists all contributions made by that institution. If multiple institutions of the collaboration are making contributions, then each institution should provide a single letter identifying the contributions made by that institution. If there are no additional institutional commitments, this must be indicated in this appendix.

- Provide Additional Institutional Commitments as Appendix 12 to the project narrative

within the same file. Do not attach a separate file.

- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 13: PROJECT TIMETABLE

This section should outline as a function of time, year by year, all the major activities or phases, deliverables and benchmarks. The successful applicant will be expected to employ standard project management discipline and must use this project timetable to report progress.

- Provide a Project Timetable as Appendix 13 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

#### APPENDIX 14: OTHER ATTACHMENT

If you need to elaborate on your responses to questions 1-6 on the “Other Project Information” document, please provide the Other Attachment information as an appendix to your project narrative. **Information not easily accessible to a reviewer may be included in this appendix, but do not use this appendix to circumvent the page limitations of the application. Reviewers are not required to consider information in this appendix, and will be instructed to ignore any information that appears to be an attempt to circumvent the page limitations of the application.**

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### REMINDERS REGARDING ALL APPENDICES

- **Follow the above instructions to include the information as appendices to the project narrative file.**
- **These appendices will not count toward the project narrative’s page limitation.**
- **Do not attach any files to fields 9, 10, 11, or 12.**

### 3. Research And Related Budget

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) 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 FOA (See [Section IV, Part H](#)).

**Cost Share:** Any proposed cost share cannot be included on the budget form itself but must be

included in the budget justification. If cost share is proposed, please include a separate section in the budget justification labeled “Cost Share” and include details of the proposed costs share with the same level of detail that is required for DOE-funded items in the budget form. At a minimum, for each budget year, identify the budget categories for which cost share is proposed, the dollar amount of cost share per category, and information supporting the amount.

The following advice will improve the accuracy of your budget request:

- Funds requested for personnel (senior, key, and other) must be justified as the product of their effort on the project and their institutional base salary.
- Funds requested for fringe benefits must be calculated as the product of the requested salary and, if present, the negotiated fringe benefit rate contained in an institution’s negotiated indirect cost rate agreement.
- Funds requested for indirect costs must be calculated using the correct indirect cost base and the negotiated indirect cost rate.
- You are encouraged to include the rate agreement used in preparing a budget as a part of the budget justification.

If you are proposing indirect costs and do not already have an Indirect Cost Rate Agreement with your Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, it is recommended that you begin preparing an Indirect Cost Rate Proposal to be submitted, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

For your convenience in preparing an Indirect Cost Rate proposal, a link to applicant resources, including indirect rate model templates, has been provided below:

<https://science.energy.gov/sbir/applicant-resources/grant-application/>.

### Budget Fields

Section A Senior/Key Person	For each Senior/Key Person, enter the requested information. List personnel, base salary, the number of months that person will be allocated to the project, requested salary, fringe benefits, and the total funds requested for each person. The requested salary must be the product of the base salary and the effort. Include a written narrative in the budget justification that justifies the need for requested personnel.
Section B Other Personnel	List personnel, the number of months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. Include a written narrative in the budget justification that fully justifies the need for requested personnel.
Section C	For the purpose of this budget, equipment is designated as an item of

Equipment	property that has an acquisition cost of \$5,000 or more and an expected service life of more than one year. If institutional policies provide for a lower threshold of capitalization costs, the designation of an item as equipment on the budget must be consistent with those policies. (Note that this designation applies for proposal budgeting only and differs from the DOE definition of capital equipment.) List <b>each</b> item of equipment separately and justify each in the budget justification section. Do not aggregate items of equipment. Allowable items ordinarily will be limited to research equipment and apparatus not already available for the conduct of the work. General-purpose office equipment is not eligible for support unless primarily or exclusively used in the actual conduct of scientific research. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section D Travel	For purposes of this section only, travel to Canada or to Mexico is considered domestic travel. In the budget justification, list each trip's destination, dates, estimated costs including transportation and subsistence, number of staff traveling, the purpose of the travel, and how it relates to the project. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). To qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Domestic travel is to be justified separately from foreign travel.
Section E Participant/Trainee Support Costs	If applicable, submit training support costs. Educational projects that intend to support trainees (precollege, college, graduate and post graduate) must list each trainee cost that includes stipend levels and amounts, cost of tuition for each trainee, cost of any travel (provide the same information as needed under the regular travel category), and costs for any related training expenses. Participant costs are those costs associated with conferences, workshops, symposia or institutes and breakout items should indicate the number of participants, cost for each participant, purpose of the conference, dates and places of meetings and any related administrative expenses. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section F Other Direct Costs	<ul style="list-style-type: none"> <li>• <b>Materials and Supplies:</b> Enter total funds requested for materials and supplies in the appropriate fields. In the budget justification, indicate general categories such as glassware, and chemicals, including an amount for each category (items not identified under "Equipment"). Categories less than \$1,000 are not required to be itemized. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Publication Costs:</b> Enter the total publication funds requested.</li> </ul>

	<p>The proposal budget may request funds for the costs of documenting, preparing, publishing or otherwise making available to others the findings and products of the work conducted under the award. In the budget justification, include supporting information. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</p> <ul style="list-style-type: none"> <li>• <b>Consultant Services:</b> Enter total funds requested for all consultant services. In the budget justification, identify each consultant, the services he/she will perform, total number of days, daily or hourly rate, travel costs, and total estimated costs. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>ADP/Computer Services:</b> Enter total funds requested for ADP/Computer Services. The cost of computer services, including computer-based retrieval of scientific, technical and education information may be requested. In the budget justification, include the established computer service rates at the proposing organization if applicable. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Subawards/Consortium/Contractual Costs:</b> Enter total costs for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details. SEE SECTION 4.</li> <li>• <b>Equipment or Facility Rental/User Fees:</b> Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget justification, identify each rental/user fee and justify. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Alterations and Renovations:</b> Enter total funds requested for Alterations and Renovations. In the budget justification, itemize by category and justify the costs of alterations and renovations, including repairs, painting, removal or installation of partitions, shielding, or air conditioning. Where applicable, provide the square footage and costs.</li> <li>• <b>Other:</b> Add text to describe any other Direct Costs not requested above. Enter costs associated with “Other” item(s). Use the budget justification to further itemize and justify.</li> </ul>
Section G Direct Costs	This represents Total Direct Costs (Sections A through F)
Section H Other Indirect Costs	Enter the Indirect Cost information for each field. Only four general categories of indirect costs are allowed/requested on this form, attach a separate sheet if needed. Include the cognizant Federal agency and contact information if using a negotiated rate agreement.

Section I Total Direct and Indirect Costs	This is the total of Sections G and H
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**BUDGET JUSTIFICATION (FIELD L ON THE FORM)**

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; materials 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. Any proposed cost share cannot be included on the budget form itself but must be included in the budget justification. If cost share is proposed, please include a separate section in the budget justification labeled “Cost Share” and include details of the proposed costs share with the same level of detail that is required for DOE-funded items in the budget form. At a minimum, for each budget year, identify the budget categories for which cost share is proposed, the dollar amount of cost share per category, and information supporting the amount. **Attach a single budget justification file for the entire project period in field L.** The file automatically carries over to each budget year.

You may wish to include the indirect cost rate agreement as a part of the budget justification.

**4. R&R Subaward Budget Attachment(s) Form**

**Budgets for Subawardees:** You must provide a separate R&R budget and budget justification for each subawardee, including but not limited to DOE/NNSA National Laboratory Contractors and non-DOE/NNSA Federal Agencies and their FFRDC Contractors.

Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and either e-mail it to each subawardee that is required to submit a separate budget or use the collaborative features of Workspace. Any proposed cost share cannot be included on the budget form itself but must be included in the budget justification. If cost share is proposed, please include a separate section in the budget justification labeled “Cost Share” and include details of the proposed costs share with the same level of detail that is required for DOE-funded items in the budget form. At a minimum, for each budget year, identify the budget categories for which cost share is proposed, the dollar amount of cost share per category, and information supporting the amount. After the subawardee has either e-mailed its completed budget back to you or completed it within Workspace, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee’s name (plus.pdf) as the file name (e.g., ucla.pdf or energyres.pdf). Filenames must not exceed 50 characters.

If the project involves more subawardees than there are places in the SUBAWARD BUDGET ATTACHMENT(S) FORM, the additional subaward budgets may be saved as PDF files and appended to the Budget Justification attached to Field L. Applicants should consult their local information technology (“IT”) support resources for any necessary assistance in converting the

forms downloaded from Grants.gov into plain PDF files that can be combined into one non-Portfolio PDF file (the Budget Justification).

Ensure that any files received from subawardees are the PDF files extracted from the SUBAWARD BUDGET ATTACHMENT(S) FORM. Errors will be created if a subawardee sends a prime applicant a budget form that was not extracted from the application package.

The budget justification(s) for any subawardee(s) should include the same information supporting each proposed cost that is required of prime awardees in their budget justification, as specified in the table under “Research and Related Budget”, above.

Note: If an application proposes subawards to a DOE National Laboratory, a Federal agency, or another Federal agency’s FFRDC, the value of such proposed subawards will be deducted from any resulting award: Those classes of organizations must be paid directly by SC. However, the details of such proposed budgets are essential for understanding and analyzing the proposed research.

DOE National Laboratories should not submit a DOE Field Work Proposal (FWP) at this time. SC will request FWPs later from those selected for funding consideration under this FOA.

**If a subaward is being proposed to a DOE/NNSA or non-DOE/NNSA FFRDC Contractor, the required authorization by the cognizant Contracting Officer for the Federal sponsoring agency, as required in [Section III.D](#). OTHER ELIGIBILITY REQUIREMENTS, should be submitted.** Submit this letter as a part of the subawardee budget justification.

## **5. 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.

## **6. Disclosure of Lobbying Activities (SF-LLL)**

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.”

## **7. Summary of Required Forms/Files**

Your application must include the following items:

<b>Name of Document</b>	<b>Format</b>	<b>Attach to</b>
<b>SF 424 (R&amp;R)</b>	Form	N/A
<b>RESEARCH AND RELATED Other Project Information</b>	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
Cognizant Federal Contracting Officer Approval, if applicable	PDF	Part of budget justification
Waiver Request, if applicable	PDF	Part of budget justification
<b>RESEARCH &amp; RELATED BUDGET</b>	Form	N/A
Budget Justification	PDF	Field L
<b>R&amp;R SUBAWARD BUDGET ATTACHMENT(S) FORM</b>	Form	N/A
Subawardee Budget Justification	PDF	Field L
<b>PROJECT/PERFORMANCE SITE LOCATION(S)</b>	Form	N/A
<b>SF-LLL Disclosure of Lobbying Activities, if applicable</b>	Form	N/A

#### **E. SUBMISSIONS FROM SUCCESSFUL APPLICANTS**

If selected for award, DOE 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 Contributing Third Parties, if applicable
- Environmental Information

Applicants that request indirect costs, and that do not already have an Indirect Cost Rate Agreement with their Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, are advised to begin preparing an Indirect Cost Rate Proposal for submission, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

## **F. SUBMISSION DATES AND TIMES**

### **1. Letter of Intent Due Date**

Not applicable

### **2. Pre-application Due Date**

February 10, 2020 5:00 PM Eastern Time

You are encouraged to submit your pre-application well before the deadline.

### **3. Application Due Date**

April 10, 2020 5:00 PM Eastern Time

You are encouraged to transmit your application well before the deadline.

### **4. Late Submissions**

Late submissions of pre-applications and applications will be rejected without further review. DOE may elect to accept a late submission if DOE, in its sole discretion, determines that the applicant was unable to make timely submissions because of DOE/national technological disruptions or significant natural disasters. Other circumstances do not justify late submissions. Unacceptable justifications include, but are not limited to, the following:

- Failure to begin submission process early enough.
- Failure to provide sufficient time to complete the process.
- Failure to understand the submission process.
- Failure to understand the deadlines for submissions.
- Failure to satisfy prerequisite registrations.
- Unavailability of administrative personnel.

You are responsible for beginning the submission process in sufficient time to accommodate reasonably foreseeable incidents, contingencies, and disruptions.

Applicants must contact the DOE Contact listed in Section VII.B. of this Funding Opportunity Announcement to request acceptance of a late submission.

Requests for late submission are only rarely approved.

## **G. INTERGOVERNMENTAL REVIEW**

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

## **H. FUNDING RESTRICTIONS**

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.

Costs for new construction (including new buildings or additions to existing buildings) will not be allowed in the Center award.

**Cost Principles:** Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulations).

**Pre-award Costs:** Recipients may charge to an award resulting from this FOA 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 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulations). 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.

**DOE User Facilities:** As explained in Section I, "Instrumentation and Facilities", access and time allocation at DOE user facilities are determined and administered separately from this FOA. Proposals will not request access or time at the facilities.

## **I. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS**

### **1. Systems to Register In**

Applicants must complete a series of registrations and enrollments to submit applications in response to this FOA. Applicants not currently registered with SAM and Grants.gov should allow **at least 4 weeks** to complete these requirements.

You should start the process as soon as possible.

You may not be able to use your preferred Internet browser: Each system has its own requirements.

Applicants must obtain a DUNS number at <https://fedgov.dnb.com/webform>.

Applicants must register with SAM at <https://www.sam.gov/>. If you had an active registration in the Central Contractor Registry (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.pdf](https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations.pdf). SAM

maintains a complete user guide at [https://www.sam.gov/sam/SAM\\_Guide/SAM\\_User\\_Guide.htm](https://www.sam.gov/sam/SAM_Guide/SAM_User_Guide.htm).

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration in SAM.gov. An applicant's TIN is an EIN assigned by the Internal Revenue Service (IRS). In limited circumstances, a Social Security Number (SSN) assigned by the Social Security Administration (SSA) may be used as a TIN. You may obtain an EIN from the IRS at <https://www.irs.gov/businesses/small-businesses-self-employed/apply-for-an-employer-identification-number-ein-online>.

DOE discourages the use of a SSN as a TIN. You are encouraged to obtain a TIN from the IRS using the website listed above.

Applicants must register with FedConnect at [www.fedconnect.net](http://www.fedconnect.net). The full, binding version of assistance agreements will be posted to FedConnect.

Recipients must register with the Federal Funding Accountability and Transparency Act Subaward Reporting System at <https://www.fhrs.gov>. This registration must be completed before an award may be made: you are advised to register while preparing your application.

## **2. Registering in Grants.gov**

Applicants must register with Grants.gov, following the instructions at <https://www.grants.gov/web/grants/applicants/registration.html>. (Additional instructions are provided in [Section IV.C.2](#) of this FOA.)

## **3. Where to Submit an Application**

You must submit the application through Grants.gov at <https://www.grants.gov/>, using either the online webforms or downloaded forms. (Additional instructions are provided in Section IV.A of this FOA.)

Submit electronic applications through the "Apply for Grants" function at [www.grants.gov](http://www.grants.gov). (Additional instructions are provided in [Section IV.C.3](#) of this FOA.) 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](mailto:support@grants.gov).

Please ensure that you have read the applicable instructions, guides, help notices, frequently asked questions, and other forms of technical support on Grants.gov.

## **4. DOE SC PAMS**

After you submit your application through Grants.gov, the application will automatically transfer into the PAMS for processing by DOE SC. Many functions for grants and cooperative agreements can be done in PAMS, which is available at <https://pamspublic.science.energy.gov>.

You will want to “register to” your application: a process of linking yourself to the application after it has been submitted through Grants.gov and processed by DOE.

You must register in PAMS to submit a pre-application (**referred to as a “preproposal” in PAMS**).

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Notifications sent from the PAMS system will come from the PAMS email address <[PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov)>. Please make sure your email server/software allows delivery of emails from the PAMS email address to yours.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with (“register to”) your institution. Detailed steps are listed below.

#### 1. CREATE PAMS ACCOUNT:

To register, click the “Create New PAMS Account” link on the website <https://pamspublic.science.energy.gov/>.

- Click the “No, I have never had an account” link and then the “Create Account” button.
- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
- Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
- PAMS will take you to the “Having Trouble Logging In?” page. (If you have been an SC merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.)

#### 2. REGISTER TO YOUR INSTITUTION:

- Click the link labeled “Option 2: I know my institution and I am here to register to the institution.” (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the “Register to Institution” link.)
- PAMS will take you to the “Register to Institution” page.
- Type a word or phrase from your institution name in the field labeled, “Institution Name like,” choose the radio button next to the item that best describes your role in the system, and

click the “Search” button. A “like” search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under “Institution Name like.” Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)

- Find your institution in the list that is returned by the search and click the “Actions” link in the Options column next to the institution name to obtain a dropdown list. Select “Add me to this institution” from the dropdown. PAMS will take you to the “Institutions – List” page.
- If you do not see your institution in the initial search results, you can search again by clicking the “Cancel” button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the “Cannot Find My Institution” button and enter the requested institution information into PAMS. Click the “Create Institution” button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the “Institutions – List” page when you are finished.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this FOA should reference DE-FOA-0002253.

## 5. Viewing Submitted Applications

Each Grants.gov application submitted to the DOE SC automatically transfers into PAMS and is subsequently assigned to a program manager. At the time of program manager assignment, the three people listed on the SF-424 (R&R) cover page will receive an email with the subject line, “Receipt of Proposal 0000xxxxxx by the DOE SC.” These three people are the PI (Block 14), Authorized Representative (Block 19), and Point of Contact (Block 5). In PAMS notation, applications are known as proposals, the PI is known as the PI, the Authorized Representative is known as the Sponsored Research Officer/Business Officer/Administrative Officer (SRO/BO/AO), and the Point of Contact is known as the POC.

There will be a period of time between the application’s receipt at Grants.gov and its assignment to a DOE SC program manager. Program managers are typically assigned two weeks after applications are due at Grants.gov: please refrain from attempting to view the proposal in PAMS until you receive an email providing the assignment of a program manager.

Once the email is sent, the PI, SRO/BO/PO, and POC will each be able to view the submitted proposal in PAMS. Viewing the proposal is optional.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Following are two sets of instructions for viewing the submitted proposal, one for individuals who already have PAMS accounts and one for those who do not.

If you already have a PAMS account, follow these instructions:

1. Log in to PAMS at <https://pamspublic.science.energy.gov/>.
2. Click the “Proposals” tab and click “Access Previously Submitted Grants.gov Proposal.”
3. Enter the following information:
  - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the Grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, “Receipt of Proposal ...”.
  - Email (as entered in Grants.gov application): Enter your email address as it appears on the SF424(R&R) Cover Page.
  - Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select “SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer).” If your name appears in block 14 of the SF424 R&R cover page as the PI, select “PI.” If your name appears in block 5 of the SF424 R&R as the point of contact, select “Other (POC).”
4. Click the “Save and Continue” button. You will be taken to your “My Proposals” page. The Grants.gov proposal will now appear in your list of proposals. Click the “Actions/Views” link in the options column next to this proposal to obtain a dropdown list. Select “Proposal” from the dropdown to see the proposal. Note that the steps above will work only for proposals submitted to the DOE SC since May 2012.

If you do not already have a PAMS account, follow these instructions:

1. To register, click the “Create New PAMS Account” link on the website <https://pamspublic.science.energy.gov/>.
2. Click the “No, I have never had an account” link and then the “Create Account” button.
3. You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
4. On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
5. Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
6. You will be taken to the Register to Institution page. Select the link labeled, “Option 1: My institution has submitted a proposal in Grants.gov. I am here to register as an SRO, PI, or POC (Sponsored Research Officer, PI, or Point of Contact).”
7. Enter the following information:
  - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g.,

00002xxxxx). Do not use the grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, "Receipt of Proposal ...".

- Email (as entered in Grants.gov proposal): Enter your email address as it appears on the SF424(R&R) Cover Page.
  - Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select "SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer)." If your name appears in block 14 of the SF424 R&R cover page as the PI, select "PI." If your name appears in block 5 of the SF424 R&R as the point of contact, select "Other (POC)."
8. Click the "Save and Continue" button. You will be taken to your "My Proposals" page. The Grants.gov proposal will now appear in your list of proposals. Click the "Actions/Views" link in the options column next to this proposal to obtain a dropdown list. Select "Proposal" from the dropdown to see the proposal.

If you were listed as the PI on a prior submission but you have not previously created an account, you may already be listed in PAMS. If this is the case, you will be taken to the PAMS home page after agreeing to the Rules of Behavior. If that happens, follow the instructions listed above under "If you already have a PAMS account..." to access your Grants.gov proposal.

The steps above will work only for proposals submitted to the DOE SC since May 2012.

For help with PAMS, click the "External User Guide" link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submissions and inquiries about this FOA should reference **DE-FOA-0002253**.

## **Section V - APPLICATION REVIEW INFORMATION**

### **A. CRITERIA**

#### **1. Initial Review Criteria**

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the applicant submitted a pre-application and was encouraged to submit a full application; (3) the information required by the FOA has been submitted; (4) all mandatory requirements are satisfied; (5) the proposed project is responsive to the objectives of the FOA. Specifically, to be responsive the proposed Center must satisfy the following:

- Assemble a large, multi-institutional, multi-disciplinary effort with a domestic organization designated as the Lead Institution
- If non-domestic participation is proposed, then identify all non-domestic entities in Table 1 and provide a justification via an addendum to Table 1.
- Propose a Lead Institution /Prime Applicant that will perform a greater percentage of the effort than any other single institutional partner, team member, or subawardee, as determined by the budget (inclusive of any required cost sharing)
- Incorporate each of the five Essential Components as described in Section I
- Address and integrate at least three levels of the QIS S&T Innovation Chain
- Include Fundamental Science as one of the levels of the Chain that it addresses
- Integrate sub-topics from at least two of the Technical Areas of Interest as described in Section I

Failure to provide any information required by the FOA may cause an application to fail the initial review. DOE reserves the right to contact applicants to request the correction of minor omissions if an application is otherwise responsive to the requirements and objectives of the FOA.

**Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.**

#### **2. Merit Review Criteria**

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following four criteria, listed in descending order of importance, as found in 10 CFR 605.10 (d), the SC Financial Assistance Program Rule.

- Scientific and/or Technical Merit of the Project;
- Appropriateness of the Proposed Method or Approach;
- Competency of Applicant's Personnel and Adequacy of Proposed Resources;
- Reasonableness and Appropriateness of the Proposed Budget

Merit reviewers will be asked to evaluate three additional criteria of equal significance to one another, but lesser significance than the criteria above, established by 10 CFR 605.10 (d):

- Justification for Center-Scale Effort, Including Cohesion and Integration of the Research Activities;
- Benchmarks, Deliverables, and Metrics;
- Strength of the Center Management Plan and QIS Ecosystem Stewardship.

Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

The bulleted items below are provided to the merit reviewers to elaborate the criteria established by 10 CFR 605.10 (d):

#### SCIENTIFIC AND/OR TECHNICAL MERIT OF THE PROPOSED RESEARCH

- The extent to which the vision of the proposed Center, and its scientific and technological goals, may advance basic research in QIS and improve the competitiveness of the U.S.
- The extent to which the proposed research and development program is at the forefront of the technical areas pertinent to the Center.
- The impact of the Center's R&D on U.S. science, technology and economy at a national scale, including long-term innovative consequences.
- The balance between high-risk high-reward efforts and solid developments with a stronger likelihood of success.

#### JUSTIFICATION FOR CENTER-SCALE EFFORT, INCLUDING COHESION AND INTEGRATION OF THE RESEARCH ACTIVITIES

- The extent to which the challenge addressed by the Center warrants a large, multi-institutional, multi-disciplinary effort that includes national laboratories, academia, and the private sector and that cuts across multiple programs in SC and requires resources at the proposed scale.
- The extent to which the challenge demands integrated, synergistic collaboration across diverse institutions that include national laboratories, academia and the private sector and multiple disciplines that comprise the Center, as opposed to a more loosely connected set of smaller projects or researchers working independently.
- The Center's substantial contributions to the mission needs of more than one SC program office, and its integration of elements from multiple technical areas of interest.
- The evidence supporting the proposed approach to create a collaborative, synergistic culture in the Center, such that the participants will deliver the necessary cohesion and integration.

#### APPROPRIATENESS OF THE PROPOSED METHOD OR APPROACH

- The effectiveness of the proposal's approach of incorporating essential components to construct the Center as an integrated, synergistic whole that makes a compelling argument for impacts that require the Center-scale investment.
- The extent to which the Center advances both science and technology in its focus area, accelerating progress from discovery to prototypical technology, integrating at least three levels of the S&T innovation chain and using co-design approaches.
- The extent to which the Center leverages other investments in DOE research and facilities and creates synergies, not duplications, with efforts developed by other federal agencies, the private sector, and academia.
- The effectiveness of Center's plans to enable cognizance of industry readiness and technology transfer.
- The appropriateness of the proposed S&T methods and approaches detailed in the proposal, and how likely they are to achieve the stated scientific and technological goals of the Center.

#### BENCHMARKS, DELIVERABLES, AND METRICS

- The appropriateness and clarity of the Center's proposed benchmarks, milestones, and deliverables for its near-, intermediate-, and long-term goals, particularly in relation to the levels of the innovation chain.
- The appropriateness of the proposed metrics to evaluate the Center's impact and accomplishments, and the evidence to justify these metrics in the context of the Center's mission and goals.
- What clearly defined mechanisms, including flexible roadmapping, does the applicant present to evaluate success/failure, make mid-course corrections, and circumvent obstacles to progress?

#### STRENGTH OF THE CENTER MANAGEMENT PLAN AND QIS ECOSYSTEM STEWARDSHIP

- The effectiveness of the Center's management plan that includes: a strong lead organization, a core location, a director and deputy director, a leadership structure with clear roles and responsibilities, and an evidence-based plan for achieving a collaborative and synergistic research culture throughout the Center.
- The effectiveness of the Center's proposed mechanisms for internal communication and coordination.
- The effectiveness of the Center's proposed coordination and collaboration plans with other potential Centers and other DOE-funded research and facilities programs, as well as outreach activities to catalyze synergies within the overall QIS ecosystem.
- Are the staffing and workforce development plans adequate to attract, nurture and retain the necessary wide range of expertise?
- Are the IP and Data Management Plans suitable for the proposed research? To what extent does the data management plan make the data available and useful to the scientific

and technological community?

#### COMPETENCY OF APPLICANT'S PERSONNEL AND ADEQUACY OF PROPOSED RESOURCES

- What evidence does the application present that the lead organization and the Center Director have proven records of success in program and personnel management of diverse teams of scientific and technical professionals for projects of comparable complexity and magnitude?
- To what extent do the applicant's senior/key personnel have proven records of research in the disciplines needed for success in this project?
- Do the team members have a strong track record in successful collaboration?
- Is the proposed access to existing research space, instrumentation, and experimental and computational facilities at the lead and partner institutions likely to meet the needs of the proposed Center? If needed, do the applicants articulate plans for access to research capabilities and resources outside of the Center, including national user facilities?

#### REASONABLENESS AND APPROPRIATENESS OF THE PROPOSED BUDGET

- Is the requested operating budget and the distribution of the funds among research tasks/themes and partners reasonable for the planned scientific and technological program? Comment on any budget items that are not well justified or appear anomalous.
- Does the budget include adequate support for the appropriate personnel to carry out the proposed research?
- Are the equipment needs adequately identified, and costs for needed new instrumentation or upgrades realistically estimated?
- Are all subcontracts, travel, student costs and other ancillary expenses adequately estimated and justified?
- How does the requested budget relate to the specified management structure?

## **B. REVIEW AND SELECTION PROCESS**

### **1. Merit Review**

Applications that pass the initial review for eligibility and responsiveness to the FOA will be subjected to a formal merit review and will be evaluated based on the criteria stated above in [Section V.A.2](#). Merit reviewers will be asked to comment on both strengths and weaknesses of each proposal with respect to each of the seven merit review criteria.

DOE may, as part of the merit review process, schedule face-to-face meetings between representatives of one or more applicants and merit reviewers to allow merit reviewers to obtain answers to their questions or additional information about the contents of the most meritorious applications. Applicants may be required to travel to a designated location for a presentation to the merit reviewers.

Following completion of the merit review, a team of Federal officials will review the

applications and the evaluations of the merit reviewers, summarize the merit reviewers' independent evaluations of the applications submitted, and recommend the application of the program policy factors, as appropriate. The evaluation process may include consideration of any of the program policy factors listed in B.4. External peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

## **2. Pre-Selection Interviews**

As part of the evaluation and selection process, DOE may invite one or more applicants to participate in Pre-Selection Interviews. Pre-Selection Interviews are distinct from and more formal than pre-selection clarifications (See Section V.B.3 of the FOA). The invited applicant(s) will meet with DOE representatives to provide clarification on the contents of the Full Applications and to provide DOE an opportunity to ask questions regarding the proposed project. The information provided by applicants to DOE through Pre-Selection Interviews contributes to DOE's selection decisions. These interviews may include DOE federal personnel, representatives from other federal agencies and non-federal merit reviewers.

In advance of convening such meetings and after coordinating with the DOE Contracting Officer, the DOE Review official will notify those applicants of the meeting and describe in detail the information that may be presented at them. Under no circumstances will the applicants be allowed to revise, enhance, or supplement their original application

DOE will arrange to meet with the invited applicants in person at DOE's offices or a mutually agreed upon location. DOE may also arrange site visits at certain applicants' facilities. In the alternative, DOE may invite certain applicants to participate in a one-on-one conference with DOE via webinar, videoconference, or conference call.

DOE will not reimburse applicants for travel and other expenses relating to the Pre-Selection Interviews, nor will these costs be eligible for reimbursement as pre-award costs.

DOE may obtain additional information through Pre-Selection Interviews that will be used to make a final selection determination. After consideration of information obtained at these meetings, the merit reviewers may refine their evaluation of the strengths and weaknesses of the individual applications and may revise the final overall adjectival rating." DOE may select applications for funding and make awards without Pre-Selection Interviews. Participation in Pre-Selection Interviews with DOE does not signify that applicants have been selected for award negotiations.

## **3. Pre-Selection Clarification**

DOE may determine that pre-selection clarifications are necessary from one or more applicants.

Pre-selection clarifications are distinct from and less formal than pre-selection interviews. The pre-selection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to DOE's written clarification questions or video or conference calls with DOE representatives.

The information provided by applicants to DOE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and DOE's selection decisions. If DOE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

DOE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

#### **4. Program Policy Factors**

The Selection Official may consider any of the following program policy factors in making the selection, listed in no order of significance:

- Availability of funds
- Relevance of the proposed activity to SC priorities
- Ensuring an appropriate balance of activities within SC programs, and the relationship of the proposed Center to other research programs in DOE.
- Potential for developing synergies between the proposed Center and other Centers or other ongoing SC research activities
- Performance under current awards
- Participation with multi-institutional teams, including national laboratories, academia and the private sector
- Demonstrations of institutional or third party commitments to the proposed Center
- Strength of impact on U.S. Competitiveness

#### **5. Selection**

The Selection Official will consider the findings of the merit review and may consider any of the Program Policy Factors described above. Additionally, DOE reserves, at its sole discretion, the right to require the removal of any proposed team member of a multi-institutional application selected for award, based on consideration of Program Policy Factors.

#### **6. Review of Risk**

Pursuant to 2 CFR 200.205, DOE will conduct an additional review of the risk posed by applications submitted under this FOA. Such review of risk will include:

- Quality of the application,
- Reports and findings from audits performed under 2 CFR 200 or OMB Circular A-133, and
- Systems maintained under 2 CFR 180.

DOE may make use of other publicly available information and the history of an applicant's performance under DOE or other Federal agency awards.

Applicants with no prior performance of DOE awards may be asked to provide information about their financial stability and or their ability to comply with the management standards of 2 CFR 200.

#### REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (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.

### **7. Discussions and Award**

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to the following: (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 200 as modified by 2 CFR 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**

It is anticipated that award selection(s) will be completed by September 1, 2020. It is expected that awards will be made in Fiscal Year 2020.

## **Section VI - AWARD ADMINISTRATION INFORMATION**

### **A. AWARD NOTICES**

#### **1. Notice of Selection**

**Selected Applicants Notification:** DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See [Section IV, Part H](#) 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**

An Assistance Agreement issued by the Contracting Officer is the authorizing award document. It normally includes, either as an attachment or by reference, the following items: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE; (4) 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation); (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; (7) Intellectual Property Provisions; and (8) 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, research awards made under this FOA will be subject to the government-wide Research Terms and Conditions published at [https://www.nsf.gov/pubs/policydocs/rtc/rtcoverlay\\_march17.pdf](https://www.nsf.gov/pubs/policydocs/rtc/rtcoverlay_march17.pdf) and the DOE Agency Specific Standard Research Terms and Conditions published at [https://www.nsf.gov/pubs/policydocs/rtc/agencyspecifics/doe\\_417.pdf](https://www.nsf.gov/pubs/policydocs/rtc/agencyspecifics/doe_417.pdf). These Terms and Conditions will be incorporated in the award by reference.

### **B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS**

#### **1. Administrative Requirements**

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation).

#### **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.

c. 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 (U.S.) 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 U.S. 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.

#### REGISTRATION REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 25 (See: <https://www.ecfr.gov>). Prime awardees must keep their data in SAM current at <https://www.sam.gov>. SAM is the government-wide system that replaced the Central Contractor Registry (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 170. (See: <https://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 SAM.

## PROHIBITION ON LOBBYING ACTIVITY

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 USC 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

### **2. Terms and Conditions**

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

The standard DOE financial assistance intellectual property provisions applicable to various types of recipients are located at:  
<https://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards>

### **3. National Policy Assurances**

The National Policy Assurances To Be Incorporated As Award Terms are located at <https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

### **4. Statement of Substantial Involvement**

Cooperative Agreements will be awarded under this FOA. Since the award will be a Cooperative Agreement, the DOE contract specialist/grants management specialist and DOE project officer will negotiate a Statement of Substantial Involvement prior to award.

### **5. Additional Conditions**

#### 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 U.S. Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the U.S. 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.

CORPORATE FELONY CONVICTION AND FEDERAL TAX LIABILITY REPRESENTATIONS (MARCH 2014)

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

- It is **not** a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months,
- 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 definitions apply:

- 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 U.S. [but not foreign corporations]. It includes both for-profit and non-profit organizations.

PUBLICATIONS

The recipient is expected to publish or otherwise make publicly available the results of the work conducted under any award resulting from this FOA. Publications and other methods of public communication describing any work based on or developed under an award resulting from this FOA must contain an acknowledgment of SC support. The format for such acknowledgments is provided at <https://science.energy.gov/funding-opportunities/acknowledgements/>. The author's copy of any peer-reviewed manuscript accepted for funding must be announced to DOE's Office of Scientific and Technical Information (OSTI) and made publicly available in accordance with the instructions contained in the Federal Assistance Reporting Requirements Checklist and Instructions incorporated in all Assistance Agreements.

**C. REPORTING**

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist is available at <https://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Forms.

## Section VII - QUESTIONS/AGENCY CONTACTS

### A. QUESTIONS

Questions relating to the Grants.gov 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](mailto:support@grants.gov). DOE cannot answer these questions. Please only contact the grants.gov help desk for questions related to Grants.gov.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9:00 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this FOA should reference **DE-FOA-0002253**. Please contact the PAMS help desk for technological issues with the PAMS system.

Questions regarding the content of this FOA **must** be submitted through the FedConnect portal. You must register with FedConnect and 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. More information is available at <https://www.fedconnect.net>.

Due to the time required to provide complete and accurate answers to questions, all questions specifically about pre-applications **must** be submitted through FedConnect no later than **12:00 Noon Eastern Time on February 5, 2020**. DOE may not respond to questions about pre-applications submitted after the designated time on February 5, 2020. All other questions **must** be submitted through FedConnect no later than **12:00 Noon Eastern Time on April 7, 2020**. DOE may not respond to questions submitted after the designated time on April 7, 2020.

DOE will try to respond to questions within 3 business days, unless a similar question and answer have already been posted.

### B. AGENCY CONTACTS

Grants.gov Customer Support	800-518-4726 (toll-free) <a href="mailto:support@grants.gov">support@grants.gov</a>
PAMS Customer Support	855-818-1846 (toll-free) 301-903-9610 <a href="mailto:sc.pams-helpdesk@science.doe.gov">sc.pams-helpdesk@science.doe.gov</a>
Technical/Scientific Program Contact	Advanced Scientific Computing Research Dr. Ceren Susut <a href="mailto:Ceren.Susut-Bennett@science.doe.gov">Ceren.Susut-Bennett@science.doe.gov</a>

## **Section VIII - OTHER INFORMATION**

### **A. MODIFICATIONS**

Notices of any modifications to this FOA will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an FOA 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 FOAs. More information is available at <https://www.fedconnect.net>.

### **B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE**

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

### **C. COMMITMENT OF PUBLIC FUNDS**

(a) A DOE financial assistance award is valid only if it is in writing and is signed, either in writing or electronically, by a DOE Contracting Officer.

(b) Recipients are free to accept or reject the award. A request to draw down DOE funds constitutes the Recipient's acceptance of the terms and conditions of this Award.

### **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 any document included in the application that contains such proprietary information and specifies the pages of the document which are to be restricted:

“The data contained in pages \_\_\_\_\_ of this document 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 and non-Federal personnel conducting administrative activities must sign a conflict of interest agreement and a confidentiality agreement prior to reviewing an application.

## 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 and may, under the Determination of Exceptional Circumstances, retain greater IP rights than would otherwise be permitted. 42 USC 5908 provides that title to such inventions vests in the U.S., except where 35 USC 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 U.S. subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G below.)

Determination of Exceptional Circumstances (DEC): DOE plans to issue a DEC pursuant to 37 CFR 401.3(a)(2) that will apply to agreements issued under this FOA requiring each applicant to agree to a U.S. Competitiveness Provision. DOE has determined that exceptional circumstances exist that warrant the modification of the standard patent rights clause for small businesses and non-profit awardees under the Bayh-Dole Act, 35 U.S.C. 200 et seq., to the extent necessary to ensure that DOE “obtains sufficient rights in the federally supported inventions to meet the needs of [DOE]” and “to promote the commercialization and public availability of inventions made in the United States by United States industry and labor” and/or further promote other purposes of the Bayh-Dole Act. 35 U.S.C. § 200.

The DEC will allow DOE, in its discretion, to retain greater IP rights than would otherwise be permitted under the Bayh-Dole Act and small businesses and nonprofit organizations may therefore need to request a waiver from those requirements. Appeals of the determination of exceptional circumstances will be made available pursuant to 37 CFR 401.4

- Specifically, as previously stated, each award will include a commitment that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States, unless the applicant can show to the satisfaction of DOE that it is not commercially feasible to do so (referred to hereinafter as “the U.S. Competitiveness Provision”). The applicant further agrees to make the U.S. Competitiveness Provision binding on any sub-awardee and any assignee or licensee or any entity otherwise acquiring rights to any subject invention, including subsequent assignees or licensees. A subject invention is any invention conceived of or first actually reduced to practice under an award. An applicant retains the ability to seek a waiver or modification of these requirements, such waivers/modifications to be granted at the sole discretion of DOE

and with the written concurrence of the Department's Assistant General Counsel for Technology Transfer and Intellectual Property.

- The U.S. Competitiveness Provision is also expected to be required for large businesses and other Non-Bayh-Dole entities under this FOA through the anticipated Class Patent Waiver described in Section VIII.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. If software is specified for delivery to DOE, or if other special circumstances exist, e.g., DOE specifying "open-source" treatment of software, then the contracting officer, after negotiation with the recipient, may include in the award special provisions requiring the recipient to obtain written approval of the contracting officer prior to asserting copyright in the software, modifying the retained Government license, and/or otherwise altering the copyright provisions.

## **G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER**

Applicants may request a waiver of all or any part of the rights of the U.S. in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this FOA, 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 U.S. 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 and will be subject to a default 20% cost share requirement. For more information, see <https://energy.gov/gc/services/technology-transfer-and-procurement/office-assistant-general-counsel-technology-transf-1>

Class Patent Waiver: DOE anticipates issuing a class patent waiver that applies to this FOA for any domestic large business that is a recipient, or subrecipient at any tier to this FOA and is providing at least 20% cost share. Under this class patent waiver, domestic large businesses would be able to elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class patent waiver, a domestic large business would have to agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States. Entities not eligible under the Class Patent Waiver would still be able to petition DOE for rights under an Advanced or Identified Patent Waiver as described above.

Nonprofit organizations or small business firms as defined by 35 U.S.C. 201 will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act, including the U.S. Competitiveness Provision pursuant to the DEC. This clause permits small business

firms and nonprofit organizations to retain title to their subject inventions. Therefore, small business firms and nonprofit organizations do not need to request a patent 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. AVAILABILITY OF FUNDS**

Funds are not presently available for this award. The Government's obligation under this award is contingent upon the availability of appropriated funds from which payment for award purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Contracting Officer for this award and until the awardee receives notice of such availability, to be confirmed in writing by the Contracting Officer.

#### **J. ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) PERFORMANCE OF WORK AT DOE FACILITIES**

With respect to the performance of any portion of the work under this award which is performed at a DOE-owned or controlled site, the recipient agrees to comply with all state and Federal ES&H regulations, and with all other ES&H requirements of the operator of such site.

Prior to the performance on any work at a DOE-Owned or controlled site, the recipient shall contact the site facility manager for information on DOE and site specific ES&H requirements.

The recipient shall apply this provision to all subawardees at any tier.

#### **K. FEDERAL, STATE, AND LOCAL REQUIREMENTS**

With respect to the performance of any portion of the work under this award, the recipient agrees to comply with all applicable local, state, and Federal ES&H regulations. The recipient shall apply this provision to all sub awardees at any tier.

#### **L. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE**

If question 4.a. on the "Research and Related Other Project Information" document indicates "potential impact on the environment", or if DOE's own review indicates it, DOE may ask the applicant to provide additional information on those impacts in order to prepare an environmental critique/synopsis per 10 CFR 1021.216. Note that this pre-award environmental critique/synopsis process would be separate from the preparation of a NEPA document such as an environmental impact statement (EIS) or an environmental assessment (EA). If DOE determines the latter documentation is necessary, this process would need to be completed, funded by and with the participation of the awardee, prior to them taking any action on the

proposed project that could have adverse environmental effects or that could limit the choice of reasonable alternatives. Note that in most cases, even when additional information is requested, preparation of such NEPA documents is rarely necessary, but DOE has the expectation that the Applicant will disclose the potential, which would serve to initiate dialog with DOE if necessary. The inability to satisfy the NEPA requirements after an award would result in cancellation of the award.

**Section IX - APPENDICES/REFERENCE MATERIAL****Glossary of Useful Grants and Cooperative Agreement terms**

<b>Acquisition cost</b>	<i>Acquisition cost</i> means the cost of the asset including the cost to ready the asset for its intended use. Acquisition cost for equipment, for example, means the net invoice price of the equipment, including the cost of any modifications, attachments, accessories, or auxiliary apparatus necessary to make it usable for the purpose for which it is acquired. Acquisition costs for software includes those development costs capitalized in accordance with generally accepted accounting principles (GAAP). Ancillary charges, such as taxes, duty, protective in transit insurance, freight, and installation may be included in or excluded from the acquisition cost in accordance with the non-Federal entity's regular accounting practices.
<b>Administrative requirements</b>	<i>Administrative requirements</i> means the general business management practices that are common to the administration of all grants, such as financial accountability, reporting, equipment management, and retention of records.
<b>Advance payment</b>	<i>Advance payment</i> means a payment that a Federal awarding agency or pass-through entity makes by any appropriate payment mechanism, including a predetermined payment schedule, before the non-Federal entity disburses the funds for program purposes.
<b>Allocation</b>	<i>Allocation</i> means the process of assigning a cost, or a group of costs, to one or more cost objective(s), in reasonable proportion to the benefit provided or other equitable relationship. The process may entail assigning a cost(s) directly to a final cost objective or through one or more intermediate cost objectives.
<b>Allocability</b>	<i>Allocability</i> means the principle which requires that an expense or service charged must directly benefit and be necessary for the performance of the project; when multiple projects are benefited reasonable proportions must be able to be assigned.
<b>Allowable cost</b>	<i>Allowable cost</i> means a cost incurred by a recipient that is: (1) reasonable for the performance of the award; (2) allocable; (3) in conformance with any limitations or exclusions set forth in the Federal cost principles applicable to the organization incurring the cost or in the award documents as to the type or amount of cost; (4) consistent with regulations, policies, and procedures of the recipient that are applied uniformly to both federally supported and other activities of the organization; (5) accorded consistent treatment as a direct or indirect cost; (6) determined in accordance with generally accepted accounting principles; and (7) not included as a cost in any other federally supported award (unless specifically authorized by statute).
<b>Application</b>	<i>Application</i> means a request for financial support of a project or activity submitted to DOE on specified forms and in accordance with DOE instructions. Also known as a proposal
<b>Appropriation Act</b>	<i>Appropriation act</i> means the statute that provides the authority for Federal agencies to incur obligations to and make payments out of the U.S. treasury for specified purposes.
<b>Approved budget</b>	<i>Approved budget</i> means the financial expenditure plan for the grant-supported project or activity, including revisions approved by DOE and permissible revisions made by the grantee. The approved budget consists of Federal (grant) funds and, if required by the terms and conditions of the award, non-Federal participation in the form of matching or cost sharing. The approved budget specified in the award documents may be shown in detailed budget categories or as total costs without a categorical breakout. Expenditures charged to an approved budget that consists of both Federal and non-Federal shares are

	deemed to be borne by the grantee in the same proportion as the percentage of Federal/non-Federal participation in the overall budget.
<b>Assurance</b>	<i>Assurance</i> means a certification by an applicant, normally included with the application or State plan, indicating that the entity is in compliance with, or that it will abide by, a particular requirement if awarded a Federal grant.
<b>Authorized organizational representative</b>	<i>Authorized organizational representative</i> means the individual, named by the applicant organization, who is authorized to act for the applicant and to assume the obligations imposed by the Federal laws, regulations, requirements, and conditions that apply to grant applications or grant awards.
<b>Award</b>	<i>Award</i> means the provision of funds by DOE, based on an approved application and budget or progress report, to an organizational entity or an individual to carry out a project or activity.
<b>Award documents</b>	<i>Award documents</i> means the entirety of the documents describing the legal relationship between DOE and an awardee or recipient. The award documents include an Assistance Agreement and other documents which may be incorporated by reference or as attachments to the Assistance Agreement. The award documents are the official, legally binding document, signed (or the electronic equivalent of signature) by a contracting officer that: <ul style="list-style-type: none"> <li>• notifies the recipient of the award of a grant;</li> <li>• contains or references all the terms and conditions of the grant and Federal funding limits and obligations; and,</li> <li>• provides the documentary basis for recording the obligation of Federal funds in the DOE accounting system.</li> </ul>
<b>Bayh-Dole Act</b>	<i>Bayh-Doyle Act</i> means a law which encourages universities and researchers to develop their inventions into marketable products; formal citation is Section 6 of the Patent and Trademark Amendment of 1980, Pub. L 96-517
<b>Budget</b>	<i>Budget</i> means the financial plan for the project or program that the Federal awarding agency or pass-through entity approves during the Federal award process or in subsequent amendments to the Federal award. It may include the Federal and non-Federal share or only the Federal share, as determined by the Federal awarding agency or pass-through entity.
<b>Budget period</b>	<i>Budget period</i> means the intervals of time (usually 12 months each) into which a project period is divided for budgetary and funding purposes.
<b>Business officer</b>	<i>Business officer</i> means the financial official of the grantee who has primary fiscal responsibility for the grant. Also known as authorized organizational representative.
<b>Capital assets</b>	<i>Capital assets</i> means tangible or intangible assets used in operations having a useful life of more than one year which are capitalized in accordance with GAAP. Capital assets include: <ol style="list-style-type: none"> <li>(a) Land, buildings (facilities), equipment, and intellectual property (including software) whether acquired by purchase, construction, manufacture, lease-purchase, exchange, or through capital leases; and</li> <li>(b) Additions, improvements, modifications, replacements, rearrangements, reinstallations, renovations or alterations to capital assets that materially increase their value or useful life (not ordinary repairs and maintenance)</li> </ol>
<b>Carryover</b>	<i>Carryover</i> means unobligated Federal funds remaining at the end of any budget period that, with the approval of the contracting officer or under an

	automatic authority, may be carried forward to another budget period to cover allowable costs of that budget period (whether as an offset or additional authorization). Obligated, but unliquidated, funds are not considered carryover.
<b>Change in scope</b>	<i>Change in scope</i> means an activity whereby the objectives or specific aims identified in the approved grant application are significantly changed by the grantee after award. Contracting officer prior approval is required for a change in scope to be allowable under an award.
<b>Closeout</b>	<i>Closeout</i> means the process by which a Federal awarding agency determines that all applicable administrative actions and all required work under an award have been completed by the grantee and the Federal awarding agency.
<b>Competitive segment</b>	<i>Competitive segment</i> means the initial project period recommended for support or each extension of a project period resulting from a renewal award.
<b>Conference (domestic or international)</b>	<i>Conference (domestic or international)</i> means a symposium, seminar, workshop, or any other organized and formal meeting, whether conducted face-to-face or via the Internet, where individuals assemble (or meet virtually) to exchange information and views or explore or clarify a defined subject, problem, or area of knowledge, whether or not a published report results from such meeting.
<b>Consortium or sub-award agreement</b>	<i>Consortium or sub-award agreement</i> means a formalized agreement whereby a research project is carried out by the grantee and one or more other organizations that are separate legal entities. Under the agreement, the grantee must perform a substantive role in the conduct of the planned research and not merely serve as a conduit of funds to another party or parties. These agreements typically involve a specific level of effort from the consortium organization's PD/PI and a categorical breakdown of costs, such as personnel, supplies, and other allowable expenses, including F&A costs. The relationship between the recipient and the collaborating organizations is considered a sub-award relationship.
<b>Consultant</b>	<i>Consultant</i> means an individual who provides professional advice or services for a fee, but normally not as an employee of the engaging party. In unusual situations, an individual may be both a consultant and an employee of the same party, receiving compensation for some services as a consultant and for other work as a salaried employee. To prevent apparent or actual conflicts of interest, grantees and consultants must establish written guidelines indicating the conditions of payment of consulting fees. Consultants also include firms that provide professional advice or services.
<b>Continuation application/award</b>	<i>Continuation application/award</i> means a financial assistance request (in the form of an application or progress report) or resulting award for a subsequent budget period within a previously approved project period for which a recipient does not have to compete with other applicants.
<b>Contract</b>	<i>Contract</i> means a legal instrument by which a non-Federal entity purchases property or services needed to carry out the project or program under a Federal award. The term as used in this part does not include a legal instrument, even if the non-Federal entity considers it a contract, when the substance of the transaction meets the definition of a Federal award or sub-award (see §200.92 Sub-award).
<b>Contractor</b>	<i>Contractor</i> means an entity that receives a contract as defined in §200.22 Contract.
<b>Contract (or Grants Management) officer</b>	<i>Contract (or Grants Management) officer</i> means a DOE official responsible for the business management aspects of grants and cooperative agreements, including review, negotiation, award, and administration, and for the interpretation of grants administration policies and provisions. COs and GMOs are delegated the authority to obligate DOE to the expenditure of funds and permit changes to approved projects on behalf of DOE.

<b>Contract (or Grants Management) specialist</b>	<i>Contract (or Grants Management) specialist</i> means a DOE staff member who works with a contract or grants management officer and is assigned the day-to-day management of a portfolio of grants and/or cooperative agreements. These activities include, but are not limited to, evaluating grant applications for administrative content and compliance with statutes, regulations, and guidelines; negotiating grants; providing consultation and technical assistance to grantees; and administering grants after award.
<b>Cooperative agreement</b>	<i>Cooperative agreement</i> means a type of financial assistance used when there will be substantial Federal scientific or programmatic involvement. Substantial involvement means that, after award, scientific or program staff will assist, guide, coordinate, or participate in project activities.
<b>Cost principles</b>	<i>Cost principles</i> means the government-wide principles, issued by OMB (or, in the case of commercial organizations, the Federal Acquisition Regulation [48 CFR 21], or, in the case of hospitals, 45 CFR 74, Appendix E, “Principles For Determining Costs Applicable to Research and Development Under Grants and Contracts with Hospitals”), on allowability and unallowability of costs under federally sponsored agreements. As of December 26, 2014, the cost principles will be consolidated in 2 CFR 200.
<b>Cost sharing or matching</b>	<i>Cost sharing or matching</i> means the portion of project costs not paid by Federal funds (unless otherwise authorized by Federal statute). See also §200.306 Cost sharing or matching.
<b>Deadline</b>	<i>Deadline</i> means the published date and/or time that a grant application is to be either postmarked/mailed or electronically submitted to the funding agency.
<b>Debarment and suspension</b>	<i>Debarment and suspension</i> means the actions taken by a debarment official in accordance with OMB guidance at 2 CFR 180, “Non-procurement Debarment and Suspension,” to exclude a person or organization from participating in grants and other non-procurement awards government-wide. If debarred or suspended, the person or organization may not receive financial assistance (under a grant, cooperative agreement, or sub-award, or contract under a grant) for a specified period of time. Debarments and suspensions carried out pursuant to 2 CFR 376 are distinct from post-award suspension action by an awarding agency.
<b>Direct costs</b>	<i>Direct costs</i> means costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity, or that can be directly assigned to such activities relatively easily with a high degree of accuracy.
<b>Disallowed costs</b>	<i>Disallowed costs</i> means those charges to a Federal award that the Federal awarding agency or pass-through entity determines to be unallowable, in accordance with the applicable Federal statutes, regulations, or the terms and conditions of the Federal award.
<b>Domestic organization</b>	<i>Domestic organization</i> means a public (including a State or other governmental agency) or private non-profit or for-profit organization that is located in the United States or its territories, is subject to U.S. laws, and assumes legal and financial accountability for awarded funds and for the performance of the grant-supported activities.
<b>DUNS number</b>	<i>DUNS number</i> means a nine-digit number established and assigned by Dun and Bradstreet to uniquely identify a business entity.
<b>Effort</b>	<i>Effort</i> means the amount of time, usually expressed as a percentage of the total, which a faculty member or other employee spends on a sponsored project. No one is allowed to spend more than 100% total commitment on all academic activities, including grant-sponsored research, university-sponsored research, teaching, administration, advising and other contracted duties. Effort is indicated on the budget in units of person-months.
<b>Equipment</b>	<i>Equipment</i> means tangible personal property (including information

	technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds the lesser of the capitalization level established by the non-Federal entity for financial statement purposes, or \$5,000. See also §§200.12 Capital assets, 200.20 Computing devices, 200.48 General purpose equipment, 200.58 Information technology systems, 200.89 Special purpose equipment, and 200.94 Supplies.
<b>Expanded authorities</b>	<i>Expanded authorities</i> means authorization to grantees under certain research grant mechanisms which waives the requirement for prior agency approval for specified actions related to awards. Example: 90-day pre-award spending authority, no cost extensions for up to one additional year, and automatic carryover of unobligated funds from one budget period to the next. The expanded authorities are now contained in the standard terms and conditions for most research grants.
<b>Expiration date</b>	<i>Expiration date</i> means generally, the date signifying the end of the current project period, after which the grantee is not authorized to obligate grant funds.
<b>Facilities and administrative costs</b>	<i>Facilities and administrative costs</i> means costs that are incurred by a grantee for common or joint objectives and that, therefore, cannot be identified specifically with a particular project or program. These costs also are known as indirect costs.
<b>Federal financial report</b>	<i>Federal financial report</i> means submitted on Standard Form (SF) 425, to indicate the status of awarded funds for the period covered. Frequency of reporting is specified in the Reporting Checklist provided as part of the award documents. Replaces the SF-269 Financial Status Report (FSR)
<b>Financial assistance</b>	<i>Financial assistance</i> means transfer by DOE of money or property to an eligible entity to support or stimulate a public purpose authorized by statute.
<b>Financial status report</b>	<i>Financial status report</i> means see Federal Financial Report.
<b>Foreign travel</b>	<i>Foreign travel</i> is meant to include travel outside of the United States and its territories and possessions (Guam, American Samoa, Puerto Rico, the Virgin Islands, and the Canal Zone) and Canada. A trip is considered foreign travel for all legs of the itinerary if the traveler does not return to his or her post prior to departure for a foreign destination. Costs for foreign travel may be restricted by the language of a Funding Opportunity Announcement.
<b>Funding opportunity announcement (FOA)</b>	<i>Funding opportunity announcement (FOA)</i> means A publicly available document by which a Federal Agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. Funding opportunity announcements may be known as program announcements, requests for applications, notices of funding availability, solicitations, or other names depending on the Agency and type of program. Funding opportunity announcements can be found at <a href="https://www.grants.gov/FIND">Grants.gov/FIND</a> . An FOA may also be known as a solicitation.
<b>Grant agreement</b>	<p><i>Grant agreement</i> means a legal instrument of financial assistance between a Federal awarding agency or pass-through entity and a non-Federal entity that, consistent with 31 U.S.C. 6302, 6304:</p> <p>(a) Is used to enter into a relationship the principal purpose of which is to transfer anything of value from the Federal awarding agency or pass-through entity to the non-Federal entity to carry out a public purpose authorized by a law of the United States (see 31 U.S.C. 6101(3)); and not to acquire property or services for the Federal awarding agency or pass-through entity's direct benefit or use;</p> <p>(b) Is distinguished from a cooperative agreement in that it does not provide for substantial involvement between the Federal awarding agency or pass-through entity and the non-Federal entity in carrying out the activity contemplated by the Federal award.</p> <p>(c) Does not include an agreement that provides only:</p>

	<p>(1) Direct United States Government cash assistance to an individual;</p> <p>(2) A subsidy;</p> <p>(3) A loan;</p> <p>(4) A loan guarantee; or</p> <p>(5) Insurance.</p>
<b>Grant-supported project or activity</b>	<i>Grant-supported project or activity</i> means those activities specified or described in a grant application or in a subsequent submission that are approved by DOE for funding, regardless of whether Federal funding constitutes all or only a portion of the financial support necessary to carry them out.
<b>Grantee</b>	<i>Grantee</i> means the organization or individual awarded a grant or cooperative agreement by DOE that is responsible and accountable for the use of the funds provided and for the performance of the grant-supported project or activity. The grantee is the entire legal entity even if a particular component is designated in award documents. The grantee is legally responsible and accountable to DOE for the performance and financial aspects of the grant-supported project or activity. Also known as awardee or recipient.
<b>Grants.gov</b>	<i>Grants.gov</i> ( <a href="https://www.grants.gov/">https://www.grants.gov/</a> ) has been designated by the Office of Management and Budget as the single access point for all grant programs offered by 26 Federal grant-making agencies. It provides a single interface for agencies to announce their grant opportunities and for all applicants to find and apply for those opportunities.
<b>Indirect costs (facilities &amp; administrative)</b>	<i>Indirect (F&amp;A) costs</i> means those costs incurred for a common or joint purpose benefitting more than one cost objective, and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved. To facilitate equitable distribution of indirect expenses to the cost objectives served, it may be necessary to establish a number of pools of indirect (F&A) costs. Indirect (F&A) cost pools must be distributed to benefitted cost objectives on bases that will produce an equitable result in consideration of relative benefits derived.
<b>Institutional base salary</b>	<i>Institutional base salary</i> means the annual compensation paid by an organization for an employee's appointment, whether that individual's time is spent on research, teaching, patient care, or other activities. Base salary excludes any income that an individual may be permitted to earn outside of duties for the applicant/grantee organization. Base salary may not be increased as a result of replacing organizational salary funds with grant funds.
<b>Matching or cost sharing</b>	<i>Matching or cost sharing</i> means the value of third-party in-kind contributions and the portion of the costs of a federally assisted project or program not borne by the Federal government. Matching or cost sharing may be required by statute or program regulation. Costs used to satisfy matching or cost-sharing requirements are subject to the same policies governing allowability as other costs under the approved budget.
<b>Merit (or peer) review</b>	<i>Merit (or peer) review</i> means the process that involves the consistent application of standards and procedures that produce fair, equitable, and objective examinations of applications based on an evaluation of scientific or technical merit or other relevant aspects of the application. The review is performed by experts (reviewers) in the field of endeavor for which support is requested. Merit review is intended to provide guidance and to the DOE individuals responsible for making award decisions.
<b>Monitoring</b>	<i>Monitoring</i> means a process whereby the programmatic and business management performance aspects of a grant are assessed by reviewing information gathered from various required reports, audits, site visits, and other sources.

<b>No-cost extension</b>	<i>No-cost extension</i> means an extension of time to a project period and/or budget period to complete the work of the grant under that period, without additional Federal funds or competition.
<b>Non-Federal share</b>	<i>Non-Federal share</i> means when cost sharing or matching is required as a condition of an award, the portion of allowable project/program costs not borne by the Federal government.
<b>Obligations</b>	<i>Obligations</i> when used in connection with a non-Federal entity's utilization of funds under a Federal award, <i>obligations</i> means orders placed for property and services, contracts and sub-awards made, and similar transactions during a given period that require payment by the non-Federal entity during the same or a future period.
<b>OMB circulars</b>	<i>OMB circulars</i> means government-wide guidance issued to Heads of Federal agencies by the Director of OMB. OMB Circulars directly pertinent to grants include the following: <ul style="list-style-type: none"> <li>• cost principles (OMB Circular A-21, OMB Circular A-87, and OMB Circular A-122);</li> <li>• uniform administrative requirements (OMB Circular A-102 and OMB Circular A-110);</li> <li>• audit requirements for non-profit organizations (OMB Circular A-133).</li> </ul> Some (but not all) of these OMB Circulars have been reissued in Title 2 of the Code of Federal Regulations. DOE administrative regulations are located in Title 10 of the Code of Federal Regulations.
<b>Other significant contributors</b>	Other significant contributors means individuals who have committed to contribute to the scientific development or execution of the project, but are not committing any specified measurable effort (i.e., person months) to the project. These individuals are typically presented at "effort of zero person months" or "as needed." Individuals with measurable effort may not be listed as Other Significant Contributors (OSCs). Consultants should be included if they meet this definition.
<b>Program participant</b>	<i>Program participants</i> are the recipients of service or training provided at a workshop, conference, seminar, symposium or other short-term instructional or information-sharing activity funded by an external grant or award, or the training beneficiaries of the project or program funded by an external grant or award. A participant is not involved in providing any deliverable to the grantee or a third party or would not be terminated or replaced for failure to perform.
<b>Participant support costs</b>	<i>Participant support costs</i> means direct costs for items such as stipends or subsistence allowances, travel allowances, and registration fees paid to or on behalf of participants or trainees (but not employees) in connection with conferences, or training projects.
<b>Person months</b>	<i>Person months</i> is the metric for expressing the effort (amount of time) PD/PI(s), faculty and other senior/key personnel devote to a specific project. The effort is based on the type of appointment of the individual with the organization; e.g., calendar year, academic year, and/or summer term; and the organization's definition of such. For instance, some institutions define the academic year as a 9-month appointment while others define it as a 10-month appointment.
<b>Pre-application or pre-proposal</b>	<i>Pre-application or pre-proposal</i> means a brief outline or narrative of proposed work and sometimes budget, for informal review by a sponsor to determine whether an application should be submitted. Three predominant reasons for requiring submission of a preliminary pre-application are: <ul style="list-style-type: none"> <li>• Reduce the applicant's unnecessary effort in proposal preparation when the chance of success is very small. This is particularly true of exploratory initiatives where the community senses that a major new direction is being</li> </ul>

	<p>identified, or competitions that will result in a small number of actual awards.</p> <ul style="list-style-type: none"> <li>• Increase the overall quality of the submission.</li> <li>• Distill the number of applications that will be submitted to the agency and the number of anticipated reviewers needed to review.</li> </ul>
<b>Pre-award costs</b>	<i>Pre-award costs</i> means any cost incurred prior to the beginning date of the project period or the initial budget period of a competitive segment (under a multi-year award), in anticipation of the award and at the applicant's own risk, for otherwise allowable costs.
<b>Prior approval</b>	<i>Prior approval</i> means written approval from the designated contracting officer required for specified post-award changes in the approved project or budget. Such approval must be obtained before undertaking the proposed activity or spending DOE funds
<b>Program Director/ Principal Investigator</b>	<i>Program Director/ Principal Investigator</i> means the individual(s) designated by the applicant organization to have the appropriate level of authority and responsibility to direct the project or program to be supported by the award. The applicant organization may designate multiple individuals as program directors/principal investigators (PD/Pis) who share the authority and responsibility for leading and directing the project, intellectually and logistically. When multiple PD/Pis are named, each is responsible and accountable to the applicant organization, or as appropriate, to a collaborating organization for the proper conduct of the project or program including the submission of all required reports. The presence of more than one PD/PI on an application or award diminishes neither the responsibility nor the accountability of any individual PD/PI.
<b>Program income</b>	<i>Program income</i> means gross income earned by the non-Federal entity that is directly generated by a supported activity or earned as a result of the Federal award during the period of performance except as provided in §200.307 paragraph (f). (See §200.77 Period of performance.) Program income includes but is not limited to income from fees for services performed, the use or rental or real or personal property acquired under Federal awards, the sale of commodities or items fabricated under a Federal award, license fees and royalties on patents and copyrights, and principal and interest on loans made with Federal award funds. Interest earned on advances of Federal funds is not program income. Except as otherwise provided in Federal statutes, regulations, or the terms and conditions of the Federal award, program income does not include rebates, credits, discounts, and interest earned on any of them. See also §200.407 Prior written approval (prior approval). See also 35 U.S.C. 200-212 "Disposition of Rights in Educational Awards" applies to inventions made under Federal awards.
<b>Program Manager</b>	<i>Program Manager</i> means the DOE official responsible for the programmatic, scientific, and/or technical aspects of a grant. The same role is filled by Program Directors, Program Officers, or Project Directors at other Federal agencies.
<b>Progress report</b>	<i>Progress report</i> means periodic, frequently annual, report submitted by the grantee and used by DOE to assess progress and to determine whether to provide funding for the budget period subsequent to that covered by the report.
<b>Project/performance site</b>	<i>Project/ performance site</i> means location(s) of where the work described in the research plan will be conducted.
<b>Project period</b>	<i>Project period</i> means the total time for which Federal support of a project has been programmatically approved as shown in the award documents; however, it does not constitute a commitment by the Federal government to fund the entire period. The total project period comprises the initial competitive

	segment, any subsequent competitive segments resulting from a renewal award(s), and extensions.
<b>Proposal</b>	See application.
<b>Re-budgeting</b>	<i>Re-budgeting</i> means reallocation of funds available for spending between budget categories to allow best use of funds to accomplish the project goals.
<b>Recipient</b>	<i>Recipient</i> means the organizational entity or individual receiving a grant or cooperative agreement.
<b>Renewal application</b>	<i>Renewal application</i> means an application requesting additional funding for a period subsequent to that provided by a current award. Renewal applications compete for funds with all other peer reviewed applications and must be developed as fully as though the applicant is applying for the first time.
<b>Research</b>	<i>Research</i> means a systematic, intensive study intended to increase knowledge or understanding of the subject studied, a systematic study specifically directed toward applying new knowledge to meet a recognized need, or a systematic application of knowledge to the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements. Also termed “research and development.”
<b>Research misconduct</b>	Research misconduct means fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community in proposing, performing, or reporting research, or in reporting research results; does not include honest error or honest differences in interpretations or judgments of data.
<b>SAM.gov</b>	<i>SAM.gov</i> is the System for Award Management (SAM), the Government-wide system that consolidated the Central Contractor Registration (CCR), the Excluded Parties List System (EPLS), the Online Representations and Certifications Application (ORCA), and the Federal Agency Registration (FedReg).
<b>Scope of work</b>	<i>Scope of work</i> means the aims, objectives, and purposes of a grant; as well as the methodology, approach, analyses or other activities; and the tools, technologies, and timeframes needed to meet the grant’s objectives. This includes the research or training plan included with the original grant application, along with any approved modifications.
<b>Senior/Key Personnel</b>	<i>Senior/Key personnel</i> means the PD/PI and other individuals who contribute to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation under the grant. Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered senior/key personnel if their involvement meets this definition. Consultants and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition. “Zero percent” effort or “as needed” is not an acceptable level of involvement for Senior/Key Personnel.
<b>Significant re-budgeting</b>	<i>Significant re-budgeting</i> means a threshold that is reached when expenditures in a single direct cost budget category deviate (increase or decrease) from the categorical commitment level established for the budget period by more than 25 percent of the total costs awarded. Significant re-budgeting is one indicator of change in scope.
<b>Small business concern</b>	<i>Small business concern</i> means a business that is independently owned and operated and not dominant in its field of operation; has its principal place of business in the United States and is organized for profit; is at least 51 percent owned, or in the case of a publicly owned business, at least 51 percent of its voting stock is owned by U.S. citizens or lawfully admitted permanent resident aliens; has, including its affiliates, not more than 500 employees; and meets other regulatory requirements established by the SBA at 13 CFR 121.

<b>Solicitation</b>	See Funding Opportunity Announcement
<b>Sub-award</b>	<i>Sub-award</i> means a legal instrument by which a recipient provides funds (or property in lieu of funds) to an eligible sub-recipient (or a lower-tier transaction) to perform a substantive portion of the grant-supported program or project. The term includes such financial assistance when provided by any legal agreement (even if the agreement is called a contract) but does not include any form of assistance which is excluded from the definition of a grant, including the recipient's procurement of property or services needed to carry out the project or program. The term includes consortium agreements.
<b>Sub-recipient</b>	<i>Sub-recipient</i> means a non-Federal entity that receives a sub-award from a pass-through entity to carry out part of a Federal program; but does not include an individual that is a beneficiary of such program. A sub-recipient may also be a recipient of other Federal awards directly from a Federal awarding agency.
<b>Supplement</b>	<i>Supplement</i> means a request for an increase in support during a current budget period for expansion of the project's scope or to meet increased costs unforeseen at the time of the new or renewal application. A supplement may increase support for future years in addition to the current year. Supplements require applications and are subject to administrative and merit review.
<b>Terms and conditions of award</b>	<i>Terms and conditions of award</i> means all legal requirements imposed on a grant by DOE, whether based on statute, regulation, policy, or other document referenced in the grant award, or specified by the grant award document itself. The award documents may include both standard and special conditions that are considered necessary to attain the grant's objectives, facilitate post-award administration of the grant, conserve grant funds, or otherwise protect the Federal government's interests.
<b>Unallowable costs</b>	<i>Unallowable costs</i> means specific categories of costs that cannot be charged, directly or indirectly, to federally sponsored agreements in accordance with federal regulations or the terms and conditions of the award.
<b>Unliquidated obligation</b>	<i>Unliquidated obligations</i> means, for financial reports prepared on a cash basis, obligations incurred by the non-Federal entity that have not been paid (liquidated). For reports prepared on an accrual expenditure basis, these are obligations incurred by the non-Federal entity for which an expenditure has not been recorded.
<b>Unobligated balance</b>	<i>Unobligated balance</i> means the amount of funds under a Federal award that the non-Federal entity has not obligated. The amount is computed by subtracting the cumulative amount of the non-Federal entity's unliquidated obligations and expenditures of funds under the Federal award from the cumulative amount of the funds that the Federal awarding agency or pass-through entity authorized the non-Federal entity to obligate.
<b>Validate</b>	In the context of the data management plan requirements, <i>validate</i> 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 news experiment or analyses, or by some other means.