Nevada System of Higher Education

Request for Pre-Proposals for the
NEVADA NSF EPSCoR RII Track-1 Program

Deadlines:
Letters of Intent: Monday, October 1, 2018
Pre-Proposals: Monday, November 19, 2018

Only researchers who have submitted a Letter of Intent (LOI) may submit a pre-proposal. Submitting an LOI does not bind you to submit an NSF EPSCoR pre-proposal, nor does it bind you to the specifics of the project described in the LOI.

I. Introduction

Nevada is eligible to submit a new proposal to the National Science Foundation (NSF)'s Established Program to Stimulate Competitive Research (EPSCoR) Research Infrastructure Improvement Track-1 (RII Track-1) in August 2019. The award is expected to provide federal funding of $20M total over five years, with $15M dedicated to science, technology, engineering, and mathematics (STEM) research activities supported by NSF. The remaining $5M in federal funds, along with a $4M in required state match ("5+4"), will fund education, workforce development, communication, evaluation, sustainability, management and administration activities required by the RII Track-1 program. *Allocation of the "5+4" will be determined solely by the NSF EPSCoR Project Director and the Nevada EPSCoR Office.*

NSF limits EPSCoR-eligible states to a single RII Track-1 proposal submission. Therefore, the Nevada System of Higher Education (NSHE) hereby invites interested research teams to submit pre-proposals (which **must** be preceded by a Letter of Intent) for evaluation by an external panel of reviewers. The panel will assist NSHE in identifying the pre-proposal most likely to result in an award under NSF's 2019 competition.

The proposed research program is the centerpiece of the RII Track-1 project. The focal point of an RII Track-1 proposal is hypothesis- and/or problem-driven research that requires a comprehensive and integrative approach to a grand challenge in a scientific area of regional or jurisdictional importance and relevance. The intellectual merit and broader impacts of the proposed activities are expected to provide the rationale for the requested infrastructure investments that, in turn, enhance the overall research capacity and competitiveness of the jurisdiction.

RII Track-1 projects are unique in their jurisdiction-wide scope and complexity. They integrate researchers, institutions, and organizations and play a role in developing the diverse, well-prepared, STEM-enabled workforce necessary to sustain research competitiveness and catalyze economic development. RII Track-1 funding is intended to add specific value to Nevada's academic infrastructure not generally available through other funding sources, while meeting these specific goals:

- catalyze the development of research capabilities and the creation of new knowledge that expands the jurisdiction's contributions to scientific discovery, innovation, learning, and knowledge-based prosperity;
- establish sustainable STEM education, training, and professional development pathways that advance jurisdiction-identified research areas and workforce development;
- broaden direct participation of diverse individuals, institutions, and organizations in the project's science and engineering research and education initiatives;
- effect sustainable engagement of project participants and partners, the jurisdiction, the national research community, and the general public through data-sharing, communication, outreach, and dissemination; and,
- impact research, education, and economic development beyond the project at the academic, government, and private sector levels.

II. Eligible Research Themes

The RII Track-1 program is intended to increase Nevada's research competitiveness by improving the state's academic research infrastructure. The proposed research theme must be of national importance and have the best potential to improve Nevada's future research and development competitiveness. As determined by the NSHE Research Affairs Council and the Nevada EPSCoR Advisory Committee, proposed research topics must have these features:

- alignment with priorities in the 2015 NSHE Science and Technology Plan;
- alignment with current scientific and engineering grand challenges, either NSF's Big Research Ideas[1] or NSF-relevant grand challenges put forth by other agencies or entities;
- topics funded by NSF's regular programmatic and cross-cutting areas; and
- leverage the strengths of all three NSHE research institutions.

Alignment with NSF's Big Process Ideas[2] is desirable but not required.

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[1] **NSF's Big Research Ideas**: 1) Harnessing the Data Revolution; 2) The Future of Work at the Human-Technology Frontier; 3) Navigating the New Arctic; 4) Windows on the Universe: The Era of Multi-Messenger Astrophysics; 5) The Quantum Leap: Leading the Next Quantum Revolution; 6) Understanding the Rules of Life: Predicting Phenotype

[2] **NSF's Big Process Ideas**: 1) Mid-scale Research Infrastructure; 2) NSF 2026; 3) Growing Convergence Research; 4) NSF INCLUDES

III. Overview of Pre-Proposal Development Process

A workshop is scheduled for Tuesday, September 4, 2018 to provide assistance and answer questions for proposing teams (registration is required; see details below in Section VI). An external panel of experts convened by an outside consulting firm will review submitted pre-proposals using NSF-based review criteria and methods. Based on the recommendations of the review panel, the NSHE Research Affairs Council will select, and the Nevada EPSCoR Advisory Committee will approve, the pre-proposal that will be invited for full proposal development.

The first step of the pre-proposal process is the submission of a required Letter of Intent (LOI) that provides a brief summary of the proposed topics and identifies the participating faculty and institutions (see Section V). LOIs will not be reviewed and are intended only to establish the range and scope of potential pre-proposals. LOIs are due Monday, October 1, 2018.

The next step is the development of pre-proposals that describe the intellectual merit, broader impacts and integration of the proposed research, and plans for developing scientific and stakeholder partnerships and collaborations. Pre-proposals are due Monday, November 19, 2018.

As per NSF, the Nevada NSF EPSCoR Project Director must be the lead Principal Investigator of the RII Track-1 proposal. The Project Director, with input by the proposal science leads, will spearhead the development of the full proposal to ensure the proposal is fully responsive to all NSF requirements, including intellectual merit and broader impacts (as defined by NSF); new faculty hires and start-up support; plans for cyberinfrastructure and data management; postdoctoral researcher mentoring; diversity; workforce development and education; partnerships and collaborations; communication and dissemination; management, evaluation and assessment; sustainability, and; integration of all project components. The Nevada EPSCoR office will provide support for budget development and proposal submission.

External review of drafts of the full proposal before submission is essential to ensure the proposal is competitive. The outside consulting firm will convene a panel of external experts in the research topic area(s), and in NSF EPSCoR RII Track-1 programs, to conduct several reviews of the draft proposal prior to submission. With input by the proposal science leads, the NSF EPSCoR Project Director and Project Administrator have sole authority on final decisions regarding proposal content and budget.

Anticipated Timeline

Event	Date
Pre-proposal workshop	September 4, 2018
LOIs due	October 1, 2018
Pre-proposals due	November 19, 2018
External review completed	early January 2019
Pre-proposal team selected	early January 2019
Full proposal development begins	mid-January 2019
Solicitation released by NSF	early May 2019*
Proposal due to NSF	early August 2019*
Notification of Awards	Spring 2020
Awards made	Summer 2020

* Based on FY18 dates

IV. Guidelines and Requirements for Developing Pre-Proposals

A successful RII Track-1 pre-proposal will provide sound platforms and opportunities for enhanced academic R&D competitiveness of Nevada's colleges and universities. It will include implementation mechanisms that have a high probability of realizing stated goals and objectives and pragmatic plans for generation of sustained non-EPSCoR support. Pre-proposal requirements encompass:

- Well integrated participation by faculty from all three NSHE research institutions: University of Nevada, Las Vegas; University of Nevada, Reno; and Desert Research Institute.
- Partnerships with NSHE community colleges and other Nevada entities (e.g., industry).
- Budgets must be comprised of no less than 20% and no more that 50% of the total project budget from any individual research institution.
- Established Nevada research programs, already at a nationally competitive level, are not eligible for direct support; however, their resources can be used to assist the development of the proposed research area and move into new science directions.
- A RII Track-1 award is a statewide enterprise and is not the appropriate mechanism to provide support for individual faculty research projects. Requests for support of such projects should be directed to NSF's research grant programs.

Examples of RII Track-1 Activities

Examples of activities appropriate for inclusion in RII Track-1 pre-proposals include, but are not limited to:

- Support for competitive levels of "start-up" funding for new faculty (this should connect to the project research activities or new and emerging areas as outlined in the pre-proposal);
- Support for competitive levels of strategic funding to attract and/or retain established faculty who are active researchers in areas aligned with the project research activities;

- Integration of research components that encourage multi-institutional and multidisciplinary research experiences for faculty and students and connections with the private sector, industry, and national laboratories;
- Support for the acquisition of equipment for research and discovery-based learning activities;
- Support for research projects targeting the full diversity of institutions across the jurisdiction, including 2-year, 4-year, and minority-serving institutions; and,
- Support for activities that promise transformative outcomes, including revolutionizing disciplines, creating new fields, or disrupting accepted theories and perspectives.

Eligible Organizations, Institutions, and Faculty
Pre-proposals may include support for academic, for-profit, and non-profit organizations, as well as individuals employed by such organizations. Cooperative programs among research universities within Nevada or between Nevada research universities and primarily undergraduate institutions, especially minority serving institutions, qualify for EPSCoR support and are encouraged. Whereas the proposed project may employ collaborations between Nevada and non-EPSCoR jurisdictions, including international participants, EPSCoR funding must only be requested for and expended in EPSCoR jurisdictions. EPSCoR funding may not be used to support participants from non-EPSCoR jurisdictions, whether it be through a formal or informal mechanism, including, but not limited to, research experiences, internships, workshops, summer camps, or outreach activities.

NSHE's appointed NSF EPSCoR Project Director provides leadership and oversight for successful implementation of the NSF EPSCoR RII awards and has overall responsibility for NSF EPSCoR Programs in Nevada. PIs and co-PIs identified in the pre-proposal will work as part of a team with the NSF EPSCoR Project Director and Nevada EPSCoR staff in the development of the full proposal and project implementation upon award. Pre-proposal and proposal PIs must be affiliated with UNR, UNLV, or DRI. In addition, all activities carried out under an EPSCoR award are subject to the restrictions concerning STEM disciplines and activities detailed in the [NSF Proposal and Award Policy and Procedures Guide (PAPPG)](#) found on the NSF website.

V. Letters of Intent (Deadline: Monday, October 1, 2018)
LOIs must be submitted in no later than **5:00 p.m. on Monday, October 1, 2018.** Use the online form at: https://epscorspo.nevada.edu/nevada-nsf-rii-track-1-letter-of-intent/

The LOI must include these elements combined into one PDF file:
1. Draft title of the project;
2. Name, department, and institution of PI/Co-PIs;
3. Names, departments, and institutions of additional collaborating faculty; and
4. An abstract of the project (one-page maximum) that describes the work in sufficient detail to determine relevance to the NSF EPSCoR RII Track-1 program and to aid in the selection of qualified reviewers.

Only researchers who have submitted an LOI may submit a pre-proposal. Submitting a LOI does not bind you to submit a NSF EPSCoR pre-proposal, nor does it bind you to the specifics of the abstract included in the LOI.

VI. Pre-Application Workshop (Tuesday, September 4, 2018)

A pre-application workshop will be held on Tuesday, September 4, 2018, 11:00 a.m. – 1:00 p.m. PIs and their senior personnel are eligible to attend this workshop. Sponsored Programs or Business Managers are also welcome. The outside consulting firm, the Nevada NSF EPSCoR Project Director, and NSHE staff will outline pre-proposal requirements, provide advice, and conduct a question and answer session. Registration is required at epscorspo.nevada.edu/nevada-nsf-rii-track-1-program-pre-application-workshop/. The workshop will be held at the System Administration Offices in Reno and Las Vegas, and a link will be sent to registered participants for remote viewing. This workshop will also be recorded and available for viewing after the event.

VII. Pre-Proposal Content (Deadline: Monday, November 19, 2018)

The following font and page guidelines must be adhered to: Times New Roman 11 pt, no more than 6 lines per inch, with 1-inch margins on all sides. A complete pre-proposal must include the following sections:

1. **Cover Page**
Click on the "NEXT" button at the bottom of the main Pre-proposal Solicitation Web site to access the online Cover Page form. *(complete online form at:)*
https://epscorspo.nevada.edu/opportunity/nevada-nsf-rii-track-1-program-pre-proposal/

2. **Project Summary** (*1 page maximum*)
Provide a clear vision for and description of the proposed RII Track-1 project and its potential impact. Briefly describe the proposed scope, research, and integration of research activities. In separate statements, provide a succinct summary of the intellectual merit and broader impacts of the proposed project. Also, briefly describe how the research activities align with the STEM research priorities in Nevada's S&T Plan. Proposals that do not contain the Project Summary, including an overview and separate statements on intellectual merit and broader impacts, will not be accepted and will be returned without review.

3. **Project Description** (*16 pages maximum*).
The project description must include clear, succinct goals, objectives, and activities for the proposed research. Activities to be facilitated by the RII Track-1 project should be described in a clear, compelling way and describe how the requested NSF support will enable successful pursuit of the project goals and lead to increased competitiveness for NSF (non-EPSCoR) funding. Provide well-documented data and other evidence, including clear references and citations to data sources, to support claims throughout the Project Description. Research goals should be substantiated by clear descriptions of the state of the art and current challenges in the research theme.
      3.1 **Status and Overview** *(2 pages maximum)*. Describe the current status of
          Nevada's academic R&D enterprise with regards to the proposed research topic,

including the strengths, barriers, and opportunities for development of the academic institutions in support of overall R&D objectives. Provide a convincing rationale for the project's scientific vision and indicate how the overall strategy, proposed implementation mechanisms, and infrastructure support will mitigate the identified barriers and improve academic research competitiveness. This section must explicitly describe the alignment of the proposed research with the STEM research priorities of the jurisdiction S&T Plan.

3.2 **Research Program** *(12 pages maximum)*. The research program is the focal point from which all other project elements derive. Provide a concise description of the research goals and intellectual focus, and describe the planned activities in sufficient detail to enable their intellectual merit and broader impacts to be assessed. Present the proposed research in the context of other efforts in the field (with appropriate references), state the major challenges and current gaps in knowledge, and comment on the novelty and/or originality of the proposed approach. The research description must contain sufficient details regarding the scientific hypotheses, goals, and research and training methods (laboratory, field, theoretical, computational, or other) such that experts in the field of the proposed research, or closely related fields, may accurately judge its intellectual merit and broader impacts. Any proposed activities to develop, improve, and deploy cyberinfrastructure must be integrated with and appropriate to the pursuit of the RII Track-1 project goals. Innovative use of cyberinfrastructure and technologies to broadly engage institutions, organizations, and sectors across the jurisdiction is encouraged. In addition to providing clear and concise evidence for intellectual merit and broader impacts of the research activities, this section should:

- identify the senior leadership and estimate the numbers of postdoctoral, graduate, and undergraduate research participants.
- briefly outline the resources (available and planned) to accomplish the research goals;
- identify the infrastructure improvements being proposed;
- clearly establish the means of developing a coordinated, collaborative approach involving multiple investigators and organizations. Describe interactions with other groups and organizations within the jurisdiction and at the national and international levels.
- demonstrate how the research builds on the strengths of UNLV, UNR, and DRI and how each institution will contribute meaningfully to the proposed research.
- clearly demonstrate how the research focus area, theme, or component contributes to the jurisdiction's strategy for the advancement of future research, education, and innovation. In particular, the narrative should demonstrate how the proposed research activities are aligned with the STEM research priorities of Nevada's S&T Plan, NSF's Big Research Ideas or other NSF-relevant scientific and engineering grand challenges, and

how they will advance the frontiers of knowledge and the jurisdiction's future competitiveness in the proposed research areas.

- Describe what a "Center of Excellence" in the proposed research area would look like at the end of the five-year award period. Indicate how such a Center would be supported *via* funding from NSF or other extramural sources.

  3.2.1 **Seed Funding and Emerging Areas.** This mechanism provides flexibility for RII Track-1 projects to respond quickly and effectively to new opportunities and pursue high-risk, high-impact, and potentially transformative research. This section should identify the areas to be invested in and their relevance to, and synergy with, the project as a whole. The mechanisms that will be employed to catalyze research in emerging areas should also be described, including anticipated funding amounts and durations for seed projects. Seed funding through the RII Track-1 is not intended to provide a substitute for NSF individual investigator funding. The criteria and mechanisms for selecting and evaluating projects must be clearly described in terms of integration with the Research Program. In addition, annual seed funding may not exceed 10 percent of the annual NSF RII Track-1 project budget.

3.3 **Partnerships and Collaborations** *(2 pages maximum)*. Partnerships allow leveraging of resources and promote sustainability. Partnerships may seed science, engineering, and education collaborations that promote innovation and STEM-pipeline development, and can range in scope from intra-jurisdictional to inter-jurisdictional, regional, national, or international. Partnerships with nationally recognized centers of R&D activity, such as federal and industrial R&D laboratories, NSF-sponsored research centers, and academic institutions with nationally-recognized research capabilities, are encouraged. Of special value are those alliances that increase linkages between Nevada researchers and their counterparts in research or technology-based small businesses and thereby increase the competitiveness of Nevada's S&T entrepreneurial talent for federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants.

Proposed activities should demonstrate how the anticipated partnerships and collaborations directly contribute to the attainment of project goals (including integration with the Research Program), increase research competitiveness, build and strengthen the STEM pipeline, provide opportunities for commercialization of research and education products, or pave the way for economic development. Proposed partnerships and collaborations may involve unfunded partners or stakeholders in the project.

All activities should be detailed with clearly articulated goals, milestones, and timelines. The Partnerships and Collaborations section should specifically articulate partnerships with large NSF or other federally funded projects, including cyberinfrastructure resources, if applicable.

4. **References Cited in the Project Description**

5. **Biographical Sketches**
Include a biographical sketch for each faculty and equivalent level participant according to standard NSF guidelines: [https://www.nsf.gov/pubs/policydocs/pappg18_1/pappg_2.jsp - IIC2f](https://www.nsf.gov/pubs/policydocs/pappg18_1/pappg_2.jsp).

6. **Budget Pages and Budget Justification** (Use attached template)
Provide a budget and a detailed budget justification by each institution involved in the project. The pre-proposal budget (direct plus indirect costs at each institution's negotiated rate) must not exceed a total of $15M.
- Budgets must be comprised of no less than 20% and no more that 50% of the total project budget from any individual research institution.
- PIs are encouraged to work with their Sponsored Programs Office and/or Business Managers well in advance to develop the budget.
- Follow NSF budget guidelines as well as the OMB Uniform Guidance when developing the budget.
- Include appropriate annual increases for salary, fringe, and tuition costs.
- Include travel for annual statewide meetings each year, alternating locations in Northern and Southern Nevada for PIs, senior personnel, and students.

Note: The budgets included in the winning pre-proposal will be subject to revision by the Project Director and Project Administrator, including incorporating costs split between federal and state special project matching funds.

7. **Facilities, Equipment, and Other Resources** *(Use attached template)*
This section of the proposal is used to assess the adequacy of the resources available to perform the effort proposed to satisfy both the Intellectual Merit and Broader Impacts review criteria. Describe only those resources that are directly applicable to the proposed research. Include descriptions of any proposed institutional commitments regarding either personnel or facilities and other physical infrastructure. **Most importantly, if an institution is required to make significant modifications to a building, acquire a new building or land, or make arrangements to use other facilities for the focal area to be successful, these requirements must be explained.** For any pre-proposal requiring significant institutional resources, applicants are strongly encouraged to initiate a discussion with the appropriate institutional authorities prior to submission of the pre-proposal.

8. **Participants and Partners** *(Use attached template)*
List all NSHE participants and organization partners that will be involved in the project. A participant is any NSHE faculty level and equivalent or other key personnel, including named

subcontractors. Include key personnel who are responsible for specific intellectual contributions, even if they will not receive funding. Participating organizations participate in, contribute to, or directly benefit from the project and may increase academic and research institutions, industry, government agencies and non-profit organizations.

9. **Letters of Commitment**

Official letters with specific commitments of resources from participating institutions <u>are required</u> for the following: new faculty hires or other key personnel; significant modifications to a building; acquisition of a new building or land; and sharing of data or facilities. The content of these letters should be confined to the specific commitments and not include general statements of support for the project, the institutions, or investigators.

VIII. Pre-Proposal Submission Requirements and Deadline

Pre-proposals that do not conform to the above specifications, or that are submitted late, will not be reviewed. Any submission received after 5:00 p.m. on Monday, November 19, 2018 will be considered late and will not be accepted.

Electronic Submission

Convert the entire pre-proposal (Sections 1 through 9 in Section VII) to a PDF file to be uploaded at: https://epscorspo.nevada.edu/opportunity/nevada-nsf-rii-track-1-program-pre-proposal/ no later than 5:00 p.m. on Monday, November 19, 2018. **Pre-proposals will only be accepted if signed by and submitted by the PI's authorized organization representative.**

IX. Pre-proposal Review Criteria

A panel of external reviewers will evaluate pre-proposals following the three NSF merit review principles:

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

When evaluating pre-proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits will accrue from implementing the proposed project. These

issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

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

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

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

Additional Solicitation Specific Review Criteria
Reviewers will also consider the following specific aspects of intellectual merit and broader impacts, as applicable:

Research Capacity – What is the potential of the project to advance the relevant fields of science and engineering while simultaneously enhancing research competitiveness and developing research capacity and infrastructure (including physical, cyber, and human resources) in Nevada? How will the proposed activities contribute to the national and international recognition of the project participants and participating organizations? What is the potential of the project to contribute to addressing NSF's Big Research Ideas and/or other NSF-relevant grand scientific and engineering challenges? What is the potential of the project to increase the capacity of the participating organizations and capability of project participants to propose and implement research activities in the future?

Jurisdictional Impacts – How well aligned are the project's research activities with the STEM research priorities described in the Nevada's S&T Plan? What is the potential to achieve meaningful and sustained impacts within and throughout Nevada with respect to education capacity, economic development (including innovation, technology transfer, and potential commercialization), and quality of life? How do the proposed activities promote organizational connections and linkages within Nevada, as well as between private and

public sectors? How well do the proposed partnerships and collaborations advance the project goals? How well does the project leverage past accomplishments and existing resources, especially those from prior RII funding and NSF, jurisdictional, and regional investments?

X. Review and Selection Process

Based on the recommendations of the external review panel and the outside consulting firm, the NSHE Research Affairs Council will select, and the Nevada EPSCoR Advisory Committee will approve, the pre-proposal that will move forward for full proposal development.

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