Introduction

The National Science Foundation Established Program to Stimulate Competitive Research Infrastructure Improvement (NSF EPCoR RII Track-1) program is designed to increase the competitive position of a jurisdiction's research and education in science and engineering and to catalyze economic development. Successful projects are jurisdiction-wide in scope and complexity, integrate individual researchers, institutions, and organizations, and develop a diverse STEM-enabled workforce. Research, education, and innovation strategies must be consistent with jurisdictional and regional objectives.

The NSF EPSCoR RII Track-1 program has evolved to emphasize hypothesis-driven research, integrated under a single, overarching theme. Projects are expected to build research and development (R&D) programs that will be competitive nationally and internationally, and will be able to be sustained by non-EPSCoR mechanisms. As a consequence, merit review evaluations are disciplinarily focused and technical.

The goal of the preproposal competition is to identify project(s) that are the most competitive candidates for advancement as a full proposal to NSF. Preproposals will be scored and ranked relative to each other, and the rankings will be advanced to the Maine Innovation Economy Advisory Board (MIEAB) for their feedback and approval.

Successful RII Track-1 projects have common features:

Intellectual Merit: RII Track-1 concepts must be highly original and innovative to be competitive. Emphasis must be placed on the intellectual merit of hypothesis-driven research. The RII Track-1 grant should contribute towards a grand challenge facing the nation and Maine. Within this grand challenge, the proposal should clearly define the focus problem to be addressed and pose a compelling, integrated set of hypotheses and strategies for accomplishing the project. The project should be of high intellectual merit and have the potential to advance the frontiers of knowledge in fundamental science and engineering.

Focus: Projects should have a single overarching theme that unites and integrates the research activities. The research activities within a theme should be integrated and contribute to the shared overarching theme. Projects composed of non-interacting activities, each localized to an individual site or organization, are not competitive.

Integration: Education, Workforce Development, Diversity and other components of the RII Track-1 project should be fully integrated with the research activities, rather than proposed as a series of separate, add-on activities.

Scope: RII Track-1 projects are jurisdiction-wide in scope. They are expected to integrate researchers, institutions, and organizations that have a stake in advancing science, technology, and education within the jurisdiction.

DEI: Diversity, Equity, and Inclusion (DEI) have only become more important to the NSF in recent years. DEI should be considered in every facet of developing a Track-1 grant.

Economic impact: RII Track-1 projects are expected to catalyze economic development in Maine. Proposed activities should have specific partnerships and collaborations that directly

contribute to the attainment of project goals, increase research competitiveness, build and strengthen the STEM pipeline, provide opportunities for the commercialization of research and education products, and pave the way for economic development. Merit review panelists are tasked with assessing jurisdictional impacts of the activities including the potential to impact economic development through innovation, technology transfer, and potential commercialization.

Sustainability: It is expected that the infrastructure improvement strategies will enable targeted research areas to become viable for securing new sources of future non-EPSCoR funding.

In May 2021, NSF EPSCoR personnel provided an update on RII Track-1 programming. A recording from the session is available [Video Link]. All senior personnel involved with the development of the preproposal should view the video. The most recent RII Track-1 proposal guidelines should also be reviewed [21-586].

Format and Organization for Phase IV Pre-proposals

Pre-proposals must conform with the NSF Proposal & Award Policies & Procedure Guide (NSF 22-1)[1]. Pre-proposals that do not conform to the requirements listed below may be returned without review.

1.   Cover Page

1.1 Co-PIs (4 max): These individuals will lead the research team effort. Co-PIs will: 1) act in the decision-making and management capacity for the research and integrated education portion of the project; 2) serve as part of the overall Maine EPSCoR Management Team with the Maine EPSCoR Director; 3) represent the research project components, the participating institutions, and stakeholders; 4) mobilize the research team to achieve the stated goals; 5) develop and implement a sustainability plan for the project.

1.2 Senior Personnel: Fill in the known senior personnel and collaborators for this project. These can include faculty, postdocs, or key individuals from non-profit research organizations, business, government, or other.

It is not necessary to identify the Principal Investigator (PI) or Project Director (PD) for the Track-1 grant in the Phase IV preproposal. The PI and PD must be the same person per current NSF guidelines.

2.   Project Summary (*1 page maximum*)

Provide a one-page summary of the proposed project consisting of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity. The Project Summary should be: written in the third person, informative to other persons working in the same or related fields, and understandable to a scientifically or technically literate lay reader. It should not be an abstract of the proposal.

The overview should include a description of the activity that would result if the proposal was funded and a statement of vision, goals, objectives, and methods to be employed; expected impacts of the proposed activities; and general plans for sustaining collaborations and impacts beyond the award period. The statement on intellectual merit should describe the potential of the proposed activity to advance knowledge. The statement on broader impacts should describe

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[1] https://www.nsf.gov/pubs/policydocs/pappg22_1/index.jsp

the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

3. Project Description (*15 pages maximum*).

    Provide a comprehensive description of the proposed research and integrated activities.

    3.1 Status & Overview (*2 pages maximum*). Describe the project within the current status of Maine's R&D enterprise, including the strengths, barriers, and opportunities for development of state institutions in support of overall R&D objectives. The proposal narrative should 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 the state's research competitiveness.

    3.2 Research and Capacity-Building Program (*11 pages maximum*). Provide a concise description of the long-term research goals and intellectual focus, and describe the planned research activities in sufficient detail to enable their scientific merit and broader impacts to be assessed.

    3.2.1 Rationale and Program Alignment. Present the focus area in the context of other efforts in the field, and state the major challenges. Provide a rationale for why this research would be considered at a "discovery frontier" for the priorities of NSF, and why Maine is in a unique position to lead in this area. Establish the need and means for proposing a large-scale, multi-disciplinary, collaborative research initiative involving multiple investigators and institutions (a common goal and synergy between all aspects of the research needs to be clear). Indicate why this activity is suited for EPSCoR and not other programs at the NSF or other agencies.

    3.2.2 Research Plan. Describe the overarching research focus that will drive this project, including the scientific hypotheses that will be addressed during a 5-year timeframe and the scientific rationale for why these are critical areas to study. *Explicitly state an overarching hypothesis-driven research question that encompasses the planned activities*. The Research Plan should establish the means of developing a coordinated, collaborative approach involving multiple investigators and institutions. *Describe interactions with other groups and organizations within the jurisdiction and at the national and international levels*. The description must clearly demonstrate how each component contributes to the jurisdiction's strategy for the advancement of future research, education, and innovation. The narrative should demonstrate how the activities are aligned with the *2017 Maine Innovation Economy Action Plan*, and other relevant state planning references, such as the *Maine Economic Development Strategy 2020-2029, a Focus on Talent and Innovation*. Clarify how the suggested activities will advance the frontiers of knowledge and the jurisdiction's future competitiveness in the proposed research areas.

    3.2.3 Project Logic Model. Provide a table that summarizes the main research goals, objectives, and action strategies for this project.

    3.2.4 Personnel and Human Infrastructure. Briefly describe the role and intellectual contribution of each confirmed senior participant, and briefly outline any plans for new hires to fill gaps in expertise. You may also describe the roles and contributions of any potential participants that may be brought on board as the project develops.

    3.2.5 Research Infrastructure. Provide a brief description of, and rationale for, the proposed research infrastructure improvements that are needed for this research effort, and that would

be supported by this Track-1 award. This could include equipment, new hires, support of existing personnel (faculty, postdocs, technicians, students, etc.), creation of an institute/center, etc. (Do not include any budget figures at this stage).

3.2.6 Expected Impacts. Briefly summarize the expected overall impact of this research effort, including highlights of potential key outcomes and outputs.

3.3 Education and Workforce Development: (*2 page maximum*). Identify overarching goals for the education and workforce development activities. Include education and workforce development efforts to be performed, including those aimed at the research participants. Describe any proposed, new efforts to attract, engage, and train graduate or undergraduate students in this research area (i.e., through research internships, new degree programs, curriculum, service learning, stakeholder internships, etc.). Describe any potential workforce development activities (i.e., mentoring and training) for faculty and postdocs engaged in the research. Explain how the grant will influence or support professional workforce development across the state of Maine. The Maine EPSCoR EOD, Laurie Bragg, can serve as an advisor for this section.

3.4 Broadening Participation. (*1 page maximum*). Identify overarching goals for broadening participation activities. Describe the current landscape of diversity, equity, and inclusion (DEI) within the jurisdiction, and provide plans for broadening the participation not only of underrepresented minority groups but also of other groups within the jurisdiction whose eventual participation in the STEM enterprise would benefit the jurisdiction. Describe the basis for the proposal's strategic choices for broadening participation, including the institutional diversity of the participating organizations. The Maine EPSCoR EOD, Laurie Bragg, can serve as an advisor for this section.

3.5 Sustainability (*1 page maximum*). Explain the vision and potential strategies for how the research activities and new infrastructure can be sustained and expanded after EPSCoR funding ends. Address the potential for new funding from the state, the NSF, other federal, or private sources. Successful RII Track-1 proposals have teams with a demonstrated track record of extramural support from NSF or other sources. Identify the specific programs (at the NSF and/or other agencies) that the project team will be enabled by the RII Track-1 project to pursue.

3.6 Management (*1 page maximum*). Briefly describe what your project management structure will potentially look like. You can utilize general descriptions when names are not yet known (note that Maine EPSCoR office staff will also be part of the overall project management structure, and be involved with the implementation of project components). This should include: Co-PIs; the research leadership team; sub-themes/thrust areas; any required research office staff positions; and an external Scientific Advisory Board.

4. References cited (*no page restriction*).

5. Biographical sketches (*2 pages maximum, each – does not count toward 14-page Project Description limit*).

   Provide biographical sketches for the Co-PIs and all confirmed Senior Personnel for the project. See the NSF Grants Proposal Guide[2] for formatting instructions.

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[2] https://www.nsf.gov/pubs/policydocs/pappg22_1/pappg_2.jsp#IIC2f