



ERC

Engineering Research Centers

Gen-4 ERC: Inclusive
Partnerships in
Convergent Research,
Workforce Development
and Innovation
NSF 19-503

Webinar
November 7, 2018

Reminder

- Participation in the **Planning Grant** program should not be construed as an application submission for this ERC competition;
- To participate in this **ERC competition**, one is not required to have submitted a planning grant proposal nor to have received a planning grant.



Webinar Outline



- Gen-4 ERC Solicitation Goals
- ERC Program Model
- ERC Program Overview
- ERC Strategic Approaches
- Important Changes for Gen-4 ERC
- Gen-4 ERC Proposal Review
- Competition Timeline
- Q&A



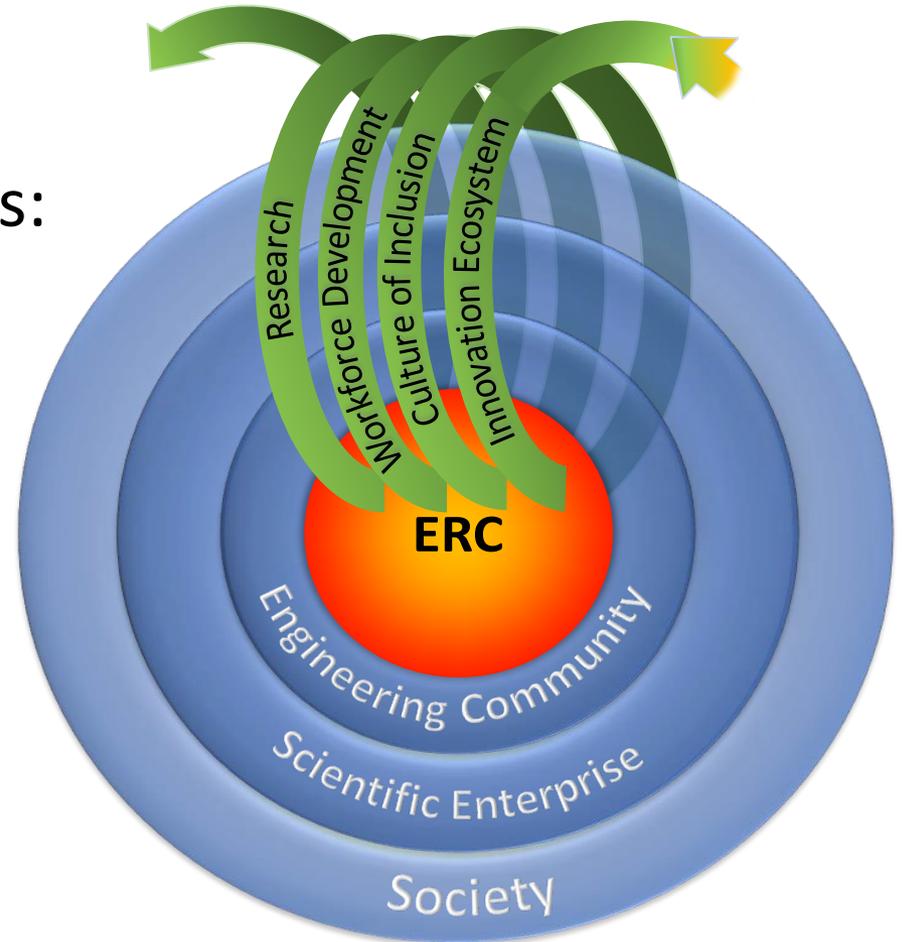
Gen-4 ERC Solicitation Goals

- This ERC solicitation has been informed by a study from the *National Academies of Sciences, Engineering, and Medicine*.
- The program continues to focus on advancing an engineered system through inclusive **cross-disciplinary** and **cross-sector** partnerships, while placing greater emphasis on research that leads to **societal impact** through **convergent** approaches, engaging stakeholder communities, and strengthening team formation.
- ERCs should have strong synergies or value-added rationale that justify a center or institute-like approach.



The ERC Model

- Foundational Components:
 - Convergent Research
 - Engineering Workforce Development
 - Diversity and Culture of Inclusion
 - Innovation Ecosystem
- Areas of Impact:
 - Engineering Community
 - Scientific Enterprise
 - Society



Foundational Components: Convergent Research

Convergence is an approach to problem solving that cuts across disciplinary boundaries.

It deeply integrates knowledge, tools, and ways of thinking from life/health sciences, physical, mathematical, and computational sciences, engineering disciplines, and beyond to form a comprehensive synthetic framework for tackling scientific and societal challenges that exist at the interfaces of multiple fields.

- **Convergent** engineering is a deeply collaborative, team-based engineering approach for defining and solving important and complex societal problems (NAE, 2017).
- **Convergent** research has the strong potential to lead to transformative solutions or new fields of study.
- <https://www.nae.edu/113283.aspx>



Foundational Components: Engineering Workforce Development

- **Human resource capacity development** aligned with the targeted engineered system; ERC engineering workforce development strengthens a robust spectrum of engineering education and pathways.
- **Workforce Development** occurs at all levels of the Center and provides opportunities for engagement by all ERC members including students, faculty, and external partners as appropriate.



Foundational Components: Diversity and Culture of Inclusion

- The culture of the ERC and teams within the ERC demonstrate an environment in which **all members** feel valued and welcomed, creatively contribute, and gain mutual benefit from participating.
- Participation from members of groups traditionally **underrepresented** in engineering as well as **diverse scientific and other perspectives** is required.



Foundational Components: Innovation Ecosystem

- **Trusted** partners that work together to create and enhance the **capacity for innovation** and new ways for delivering value with positive societal impact.
- Include **effective translational efforts** from ideation to **implementation**, workforce development for the **enterprise**, and deliberate efforts to attract **funding** and **resources**.
- **Articulate plans** for strategic engagement of stakeholder communities while **including the legal frameworks** needed to protect the participants.



ERC Program Overview:

Impact on Society

- **Societal Impact** represents opportunities and challenges that may be addressed through advances in engineering research and innovation for the benefit of society at large.
 - Potential **societal impact** should be relevant and complex, and not limited to any specific schema of grand challenges



ERC Program Overview:

Impact on the Scientific Enterprise

- **Scientific Enterprise:** ERCs should be exemplars of how cohesive, high-performing teams engage in convergent research and innovative approaches to create major impact that informs and inspires the scientific community, engineering and beyond.



ERC Program Overview:

Impact on the Engineering Community

- **Engineering Community:** ERCs directly impact the engineering community, preparing students and researchers by highlighting new engineering approaches and best practices for engineering workforce development, diversity and inclusion, and academic-industrial partnerships.



ERC Strategic Approaches: Team Formation

- **Team Formation** is the process by which all necessary disciplines, skills, perspectives, and capabilities are brought together.
- Successful teams are interdependent, multidisciplinary, and diverse; can work and communicate effectively even when geographically dispersed; and effectively overcome barriers to collaboration.
- Best practices:
<https://www.nap.edu/catalog/19007/enhancing-the-effectiveness-of-team-science>



ERC Strategic Approaches: Stakeholder Community

- **Stakeholder Community** includes all parties who may contribute to the ERC or may be impacted by the ERC.
- **Stakeholders** can include but are not limited to:
 - Relevant researchers across partner institutions with complementary research and education expertise;
 - Industry leaders who can guide the innovation effort;
 - Partners for innovation, education, workforce development, and diversity;
 - Beneficiaries of the ERC outcomes (community members, users, customers, patients, and policy-makers, et al.).



Changes in ERC Solicitation:

Focus

- **Societal Impact:**
 - Enable society to have a better quality of life, and be more resilient, productive, and/or safe.
- **Convergence:**
 - The deep integration of knowledge, tools, and ways of thinking beyond engineering (for example, from the physical, mathematical, life/health sciences, computational sciences, and social sciences, among others).
- **Team Formation:**
 - Supporting convergence, the formation of diverse scientific teams.
- **Culture of Inclusion and Diversity:**
 - Both inclusion of underrepresented groups and inclusion of team members from different scientific disciplines.
- **Review Criteria:**
 - Additional Review Criteria reflect the changed focus areas.



Changes in ERC Solicitation:

Flexibility in Eligibility

- Limit on Number of Letters of Intent and Preliminary Proposals:
 - Per Institution: None
 - Per PI or Co-PI: None
- The lead institution must have an Engineering Department/School, offering degrees at the Bachelors, Masters, and PhD level.
- A letter of support must be received from the Dean of Engineering at that institution.



Changes in ERC Solicitation:

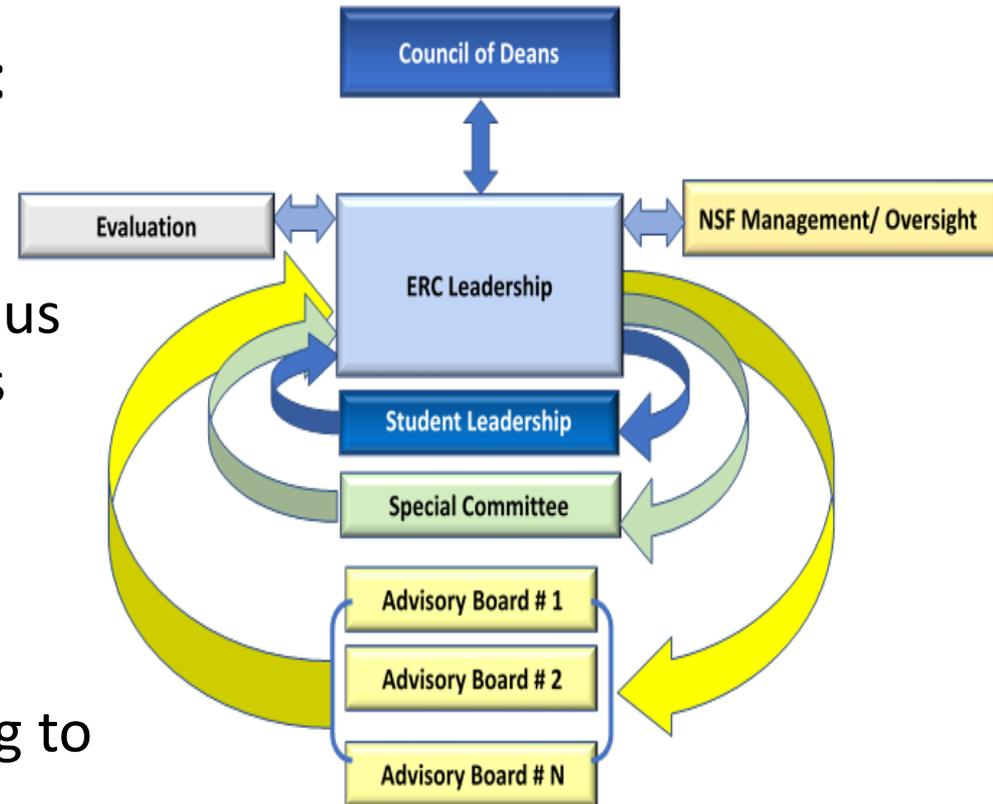
Flexibility in Personnel

- Principle Investigators:
 - The Lead PI must be a tenured faculty member at the Lead Institution; cannot change.
 - The Lead PI does not have to be from an Engineering Department.
 - The Lead PI and the ERC Director are not required to be the same person, but both must be from the Lead Institution.
 - Non-Lead PIs are the PIs listed on the Cover Sheet after the Lead PI and may be from institutions other than the lead university.
 - Non-Lead PIs do not need to be tenured; may change.
- Leadership Roles:
 - Opportunity for different models of leadership
 - Exception: ERC Administrative Director role is required.



Changes in Solicitation: Flexibility in Management

- Management Structure:
 - More freedom and creativity
 - Define the roles of various advisory boards/entities
- Explain the ERC's processes for
 - Team communication
 - Taking in and responding to advisory feedback



Changes in Solicitation:

Award Information

- Estimated Number of Awards: **3-4**
- Anticipated Funding Amount:
 - \$14,000,000 to support the first year for up to four newly funded ERCs, depending on availability of funds in FY2020.

| Year | Allowable Max Budget | Year | Allowable Max Budget |
|------|----------------------|------|----------------------|
| 1 | \$3,500,000 | 6 | \$6,000,000 |
| 2 | \$4,500,000 | 7 | \$6,000,000 |
| 3 | \$6,000,000 | 8 | \$6,000,000 |
| 4 | \$6,000,000 | 9 | \$4,000,000 |
| 5 | \$6,000,000 | 10 | \$2,600,000 |

- The initial ERC award would be for five years.
- Cost Share is required for all 10 years of an ERC.



ERC Proposal:

Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria, **Intellectual Merit** and **Broader Impacts**.

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

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



ERC Preliminary Proposals: Additional Review Criteria

Questions to Guide the Narrative:

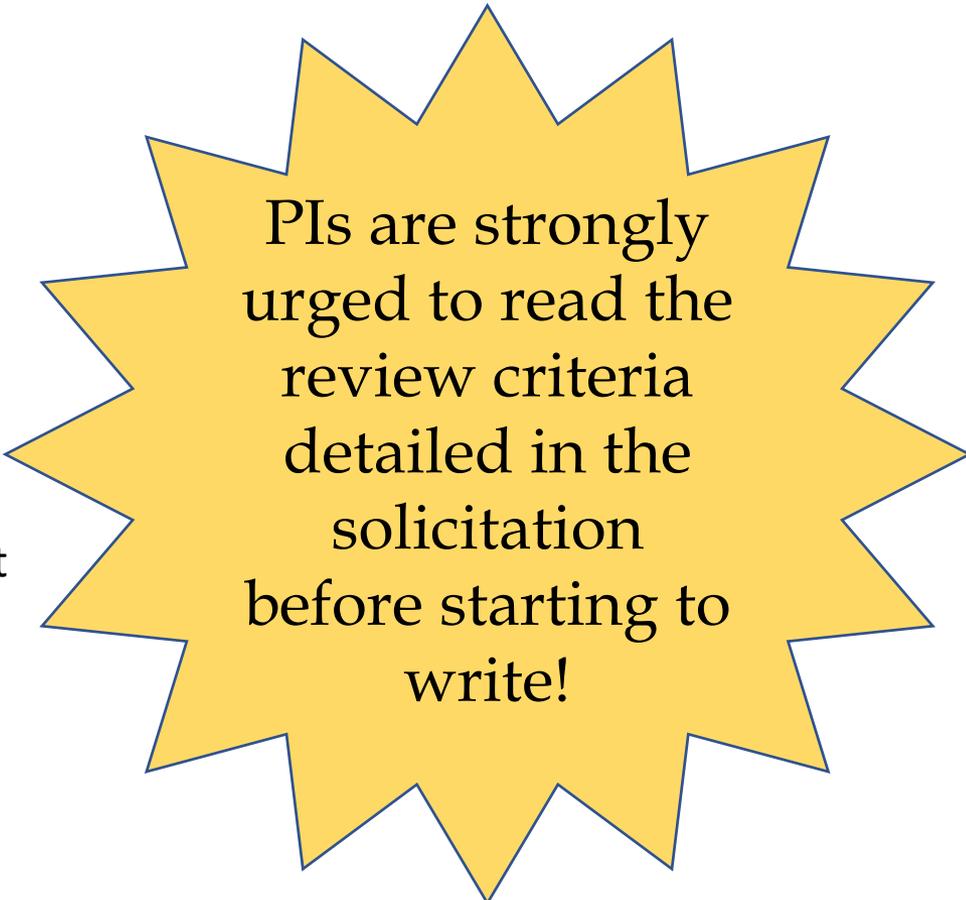
- What is the compelling new idea and what is the potential high societal impact?
- Why is an ERC necessary to tackle the idea?
- How will the ERC's infrastructure integrate and implement convergent research, engineering workforce development, diversity and culture of inclusion, and an innovation ecosystem to achieve its vision and create societal impact, impact on the scientific enterprise, and impact on the engineering community?
- What is the proposed management structure for the ERC and how will it foster team-formation and convergent research, as well as an integrated approach for items 1-3 above?
- What are the proposed strategies for engaging and developing the appropriate stakeholder community?
- How will all ERC participants engage in a unique experience that would otherwise not be available?



ERC Full Proposal:

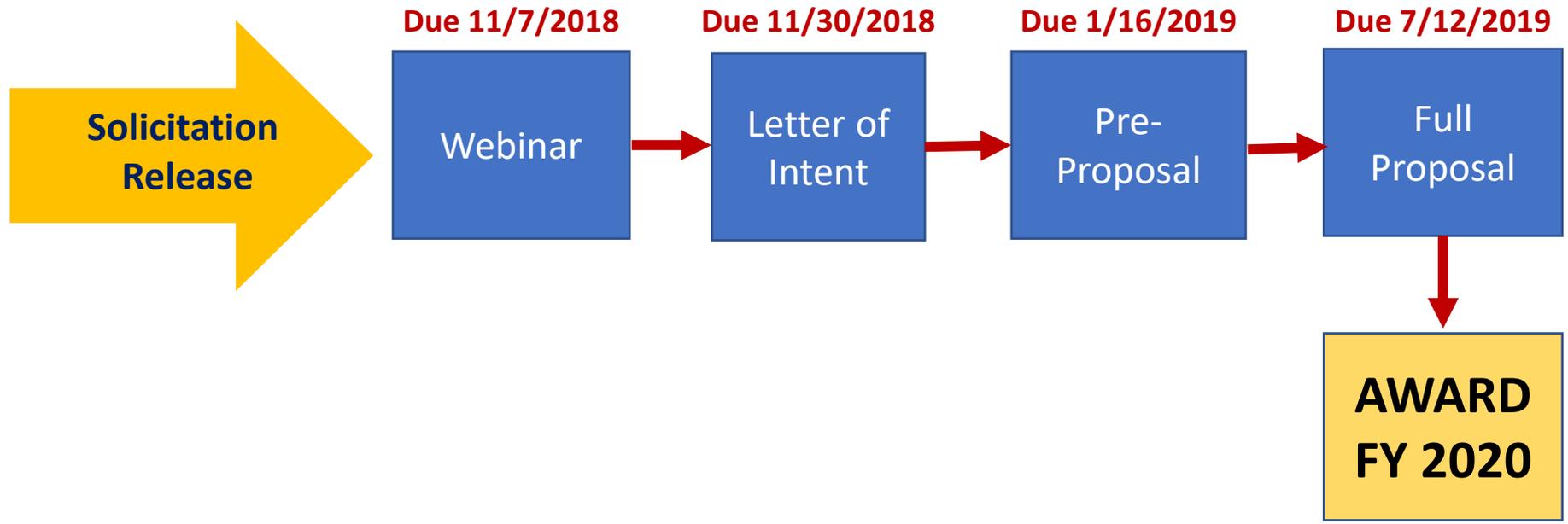
Additional Review Criteria in These Areas

- Vision
- High Societal Impact
- Convergence
- Stakeholder Engagement
- Team Formation
- Strategic Plan
- Infrastructure
- Research
- Engineering Workforce Development
- Diversity and Culture of Inclusion
- Innovation Ecosystem
- Evaluation Plan
- Financial Support and Resources



PIs are strongly urged to read the review criteria detailed in the solicitation before starting to write!

Key Dates on Competition Timeline



Consultation with ERC Program Directors (PD)

1. At any time, you may submit questions about the solicitation to NSFERC@nsf.gov
2. Ask questions during this webinar
 - a) Submit question via the WebEx Q&A
 - b) Ask questions through the Operator
3. Request a 30 minute OFFICE HOUR teleconference through the TimeTrade App with a NSF Program Director to discuss specific ideas and ask questions.



Consultation with ERC Program Directors (PD)

- After the webinar, PDs will establish office hours where PIs may sign-up for a one time only 30 minute teleconference to discuss specific ideas and ask questions.
- Place your request through the Time Trade link <https://my.timetrade.com/book/NQLCH>
- The consulting Program Director will send an email confirming the requested timeslot.
- In advance of the teleconference, you **must** email the consulting Program Director:
 1. An ERC 3-Plane Strategic Planning Chart for your proposed engineered system concept;
 2. A short description (less than two pages) of the proposed ERC in response to the solicitation requirements.
- Only one timeslot per preliminary proposal will be allowed



Program Director Office Hours (EST)

Available timeslots from November 13, 2018 to December 17, 2018

| MONDAYS | TUESDAYS | WEDNESDAYS | THURSDAYS | FRIDAYS |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| 1:00 PM to 1:30 PM | | 1:00 PM to 1:30 PM | 1:00 PM to 1:30 PM | |
| 1:30 PM to 2:00 PM | | 1:30 PM to 2:00 PM | 1:30 PM to 2:00 PM | |
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| | 5:00 PM to 5:30 PM | | | 5:00 PM to 5:30 PM |
| | 5:30 PM to 6:00 PM | | | 5:30 PM to 6:00 PM |



Office Hours Summary

- There are a fixed number of timeslots
- Once a timeslot expires, it will not be replaced
- Office hours rules of engagement:
 - 1 timeslot per Preliminary Proposal
 - Provide required documents prior to Office hours



Resources

- This full slide set will be posted on the Gen-4 ERC Program landing page following the webinar.
- Gen-4 ERC Program landing page: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505599
- ERC Association Website: <http://erc-assoc.org/>
- *A New Vision for Center-Based Engineering Research*: <https://www.nap.edu/catalog/24767>
- *Convergence*: <https://www.nap.edu/catalog/18722>
- *Enhancing the Effectiveness of Team Science*: <https://www.nap.edu/catalog/19007>



The background is an abstract composition of various shades of blue, ranging from light cyan to deep navy. It features numerous overlapping, wavy, and curved lines that create a sense of depth and movement, similar to a tunnel or a digital data stream. A bright, glowing light source is positioned at the top center, casting a soft, ethereal glow across the scene.

Questions?