ERC Solicitation 15-589 Webinar

Guidance for Preliminary Proposal Development
Aug 31, 2015
10:00 AM EDT

Engineering Research Centers Program

Division of Engineering Education and Centers

Engineering Directorate, NSF

Format and Team for the Webinar

- New Features: NSF 15-589 Engineering Research Centers (ERCs)

- ERCs, Proposals, and Research Program
  - Program Overview/Proposal Guidance - Keith Roper, ERC Leader/EEC
  - Vision and Strategic Plan for Research - Keith Roper, ERC Leader/EEC

- Workforce Development
  - University – Elliot Douglas, Engineering Education Program Director/EEC
  - Pre-college – Mary Poats, RET Program Director (PD)/EEC

- Infrastructure
  - Broadening Participation – James Moore, Broadening Participation PD/EEC
  - Infrastructure - Carmiña Londoño, Engineering Research Centers PD/EEC

- Innovation Ecosystem
  - Deborah Jackson, Engineering Research Centers PD/EEC

NSF 15-589
New Features

Three Fundamental Questions

- *What is the compelling new idea and how does it relate to national needs?*
- *Why is a center necessary to tackle the idea?*
- *How will the ERC's infrastructure integrate and implement research, workforce development, and innovation ecosystem development efforts to achieve its vision?*

Specific Review Criteria

- Integrated <u>Strategic Plans</u> for Research, Workforce Development, Innovation
- <u>Leadership</u>: expertise in research, workforce development, and innovation
  - Diversity Director: experienced in activities proven to create culture of inclusion
- <u>Research</u>: impact, benchmarking, partnerships, system-at-scale
- <u>Workforce Development</u>: literature-based, inclusive, assessment
- <u>Innovation</u>: scale-able, sustainable, community
- <u>Infrastructure</u>: plan for community of inclusion

NSF 15-589
New Features

Budget Increase

- Ramps $250,000 per year from $3.5M (Yr 1) to $4.25M (Yr 4)

Proposal features

- 9 pages (Preliminary Proposal) + 1 page three-plane chart
- Topic: Open Topic or Nanosystem ERC
- Proposal contents
  - Proposed vision: Transformative, Unique, Convergent
  - Strategic plans: Critical path, Resources, Adaptive
- Advisory boards
  - Workforce Development Advisory Board
  - Incorporate guidance of advisory boards regularly into strategic management of the Center

New Features
Q&A

Engineering Research Centers Program

ERC Program Goals

Create a culture in academia that:

- Links interdisciplinary scientific discovery to technological innovation

- Produces diverse engineering graduates who will be highly effective in industrial practice and creative innovators in a global economy

- Partners with industry and other practitioners to develop a healthy innovation ecosystem

ERC Key Features

- *Guiding strategic engineered systems vision that*:
  - joins fundamental research, enabling technology, and transformational engineered systems research to realize proofs of principle and innovation
  - develops an innovative, globally competitive, and diverse engineering workforce

- *Strategic plans*
  - motivate and guide the research, education, and innovation programs to achieve the vision
  - drive selection, integration of research through testbed proofs of principle

- *Interdisciplinary, systems-motivated research program*
  - fundamental and applied research
  - enabling and systems technology, demonstrated in academic-scale, proof-of-concept test beds

What's an Engineered System?

- A combination of components and elements that work together to perform a useful function
- New technology platform for:
  - new product line or new manufacturing process
  - transforming public sector, healthcare services, or infrastructure services
- Research is designed to:
  - address fundamental barriers
  - advance proofs of principle in test beds
  - incorporate factors effecting system-wide performance (e.g., utility, efficiency, resilience, etc.)

Guidance for Proposals

Principal Investigator (PI):
Eligibility Requirements

- Tenured faculty member in an engineering department/school of engineering at the lead university
  - Ph.D. in engineering; or
  - Ph.D. in associated field of science with:
    - Substantial career experience in engineering
    - Primary appointment in an engineering department or school of engineering

- PI and co-PIs: identified expertise in research, workforce development, and innovation

Lead University:
Eligibility Requirements

Submission as lead university only by a U.S. University with:

- B.S., M.S., and Ph.D. engineering degree programs
- Breadth and depth to support proposed vision

Institution Serving Large Numbers of Minority Groups Underrepresented in Engineering

- Must be lead or partner institution
- May classify under Dept. of Education guidelines: http://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html ; or
- Document significant enrollment of minority students (i.e., African Americans, Pacific Islanders, Native Americans, Hispanic Americans, and persons with disabilities who are U.S. citizens of Permanent Residents) who are majoring in STEM, and particularly engineering, studies to qualify; and
- Document graduation track record of underrepresented minority groups

Invited Full Proposal:
Organizational Requirements

- Lead and up to four domestic partner universities or colleges (one serving large numbers of underrepresented groups) that commit to cost share and participate in all ERC frameworks

- Fee paying industry partners, including practitioner organization partners as appropriate

- Long-term pre-college institutional partners

- State/local government and/or university/private innovation partners to stimulate innovation and entrepreneurship

- Commitment to include participating foreign partners/collaborators (in proposal or future)

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Invited Full Proposal:
Organizational Options

- Affiliated universities/colleges/institutions that:
  - Academic institutions that provide ≤ 2 faculty for specific research and/or education tasks
  - Federal laboratories providing staff for specific tasks (cannot be supported by NSF funds)
- Community colleges and/or technical colleges that participate in the education programs

Pre-proposal feedback from NSF:
July – Oct 22, 2015

- Teleconference with ERC Program Director
  - Send email to kroper@nsf.gov with ≤ 10-sentence summary of ERC engineered system, including the research focus, engineering workforce development program, and innovation ecosystem and 3-plane diagram
  - An ERC Program Director (PD) will contact you to arrange a teleconference with your team for a maximum of 45 minutes.
  - Send slides (maximum of 10) for discussion in advance. Slides should address the proposed vision, strategic plan, research thrusts, workforce development (education), innovation ecosystem, infrastructure, and 3-plane chart.

Letter of Intent (LOI):
Due Sept 25, 2015

- ***Required*** in Order to Submit a Pre-Proposal

- Used by NSF to determine proposal load and form preliminary sets of reviewers

- PI may only submit a preliminary proposal, if an LOI is submitted

- There will be no official response from NSF regarding the LOI

Letter of Intent (LOI):
Submission Requirements

- Identify one to four participating partner universities

- Multiple LOIs may be submitted by lead university

- PI (Center Director) may submit only one LOI

- No change in partners, PI, or co-PIs between LOI submission and preproposal

PI and Co-PI:
Limitations

- Submitting PI (Center Director) may submit only one LOI and one preliminary proposal
  - PI is binding after submission of the preliminary proposal
- PI may not participate in any other LOI or preliminary proposal, while a PI
- Co-PI may participate in more than one LOI or preliminary proposal
- No change in PI or Co-PIs between LOI submission and preliminary proposal
- Co-PIs may change after acceptance to submit full proposal

Preliminary Proposal:
Due Oct 23, 2015

- Project Summary (1 page)
- Nine-page preliminary proposal
  - Proposing team
  - Brief summaries of the vision, research, workforce development (education), innovation ecosystem
- 1-page 3-plane strategic planning chart
- References cited
- Biographical sketches
- No budget
- Supplementary document: Letter of commitment from Dean of Engineering, lead university
- No other supporting documents, no lists of firms, etc.
- Send PI,, Co-PI,, and Participant Table to **ercintent@nsf.gov**

Preliminary Proposal:
Organizational Requirements

- Lead and up to four partner institutions committed to participate in the research and education programs of the ERC

- Minimum of three faculty and three student participants must be at each partner institution

- No other partners and no member firms at this stage

- Lead is binding throughout the process

Preliminary Proposal:
Submission Limits

- No limit on the number of preliminary proposals a university may submit

- The PI may submit only one preliminary proposal

- If the PI leaves the submitting university, the proposal remains with the submitting university

Preliminary and Invited Full Proposal:
Submission and Award Limits

- University with more than one funded ERC, in ERC classes of 2006-2015 by October 1, 2016, may not submit a preliminary proposal
  - But, it may be a partner in other preliminary ERC proposals
- No limit on the role of the lead university as a partner in other proposals
- Lead university may receive only one award as lead in NSF 15-589

Preliminary Proposal:
Review Process

- LOIs to be used to form panels around technology areas

- Panels to be finalized upon receipt of the proposals

- Proposals to be sent out for review in Oct-Dec 2015

- Panels to be held in December 2015

- Invitations for full proposals to be sent in January - February 2016

- Full proposals are due June 16, 2016

- Up to four awards will be made, depending on budget

- Awardees to be notified Sept. 2017

Program Level Overview/Guidance for Proposals
Q&A

Vision, Strategic Plan, Research

ERC Engineered Systems Vision:
Topic Area

- Open Topic ERC
  - Engineered system(s) chosen by the PI
- Nanosystems ERC
  - Engineered system(s) chosen by the PI
  - Vision requires a substantial body of new fundamental nanoscale research
  - Scaling from fundamentals to devices, components, and systems to assure sustained nano-enabled functionality
- No preference at NSF for either topic area

ERC Engineered Systems Vision:
Qualities and Best Practices

- <u>Transformative</u>: discoveries and basic research drive compelling advances toward an emerging, potentially revolutionary engineered system
  - o Potential to significantly change current practices, establish new industries, transform public sector services, healthcare, or the infrastructure, etc.
  - o Could increase national competitiveness or contribute to the solution of a major societal problem with national or, perhaps, international impact

- <u>Convergent</u>: Envisioned results are achievable in 10 years by strategic alignment of nascent discoveries, existing capabilities, and resources

ERC Engineered Systems Vision:
What doesn't qualify?

- Not <u>unique</u>:
  - Engineered systems topics that significantly overlap an ongoing or graduated ERC do not qualify
  - Discussion of added value relative to achievements and/or plans of other related large centers is lacking
  - Added value relative to achievements and/or plans of other large centers is not significant
- Proposals focused on transformations of engineering education as an engineered system do not qualify
  - However, proposals that address educational technology as an engineered system would qualify

ERC Vision, Strategy, and Research:
What doesn't fit the ERC model?

- <u>Insufficient resources</u> (e.g., knowledge/technology base, personnel, infrastructure, etc.) to integrate research with enabling technology, reach milestones, and realize proof of principles in systems test beds within 10 years.

- <u>Unbalanced</u> focus on exploration of a phenomena, discovery, technology improvement, or innovation without clear systems integration and/or end-to-end strategic planning.

- Proposed work is incremental without compelling transformational impact - too applied.

- <u>State of the art</u> advances in basic research or commercial capabilities are unanticipated, overlooked, or not integrated into planned resources/activities to achieve vision.

Preliminary Proposal:
9-Page Project Description Requirements (p.23)

- **Infrastructure:** PI/co-PI expertise in discovery, workforce development, innovation
- Ten-year **vision** to link discovery to transformational engineered system and its impact
- **Strategic Research Plan**
  - Identifies barriers, gaps, and requirements based on review of state of the art
  - Leverages recent internal and external breakthroughs to achieve vision
  - Aligns resources to support critical path actions, and adapts, to disrupt state of the art
- **Research:** addresses barriers to achieve ERC vision at fundamental, technological, and proof-of-concept, test-bed levels.
- **Workforce Development:** literature-based, inclusive, K-grad approach to achieve goals (e.g., via skill sets) with curricula, activities that evolve based on assessment
- **Innovation Ecosystem:** Strategic selection of sectors/firms, specification of roles of industry/ practitioner members, and cultivation of innovation in the ERC.
  - Do not list potential or committed industrial or other supporters
- **Dean's Letter** plus required NSF proposal documents. No other supporting letters.

Preliminary Proposal:
Preparing the Proposal

- Examine the review criteria (pp. 22-24)

- Study the guidance and requirements for preliminary and full proposals (pp. 5-10, 13-19)

- In light of review criteria, guidance, and requirements, prepare your preliminary proposal

- Include your 3-plane strategic planning chart
  - download: http://www.erc-assoc.org/funding_opportunities

ERC Strategic Planning:
Organizing the Research Program

- <u>Context</u> for ERC vision: barriers, knowledge gaps, and requirements are
  - identified by comprehensive state of the art analysis
  - informed by environmental, societal, and other factors
- <u>Critical path</u>: resources allocated to leverage internal/external discoveries to achieve quantifiable milestones to realize system goals, ERC vision
  - 10-yr milestone chart plots deliverables and interdependencies
- <u>Resources</u>: defines required support for interdisciplinary projects and thrusts is necessary to bridge barriers and gaps to achieve systems requirements.
- Guides resource allocation to reach technology and systems-level milestones (via metrics, figures of merit) and deliverables.
- <u>Adaptive</u>: provides flexibility to evolve as discoveries and advances are made and new barriers/challenges arise
- Requirements and barriers motivate selection, refining, and pruning of projects at fundamental, enabling technology, and systems levels

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ERC Research Program:
Thrusts and Test Beds

- <u>Thrusts</u>: integrate fundamental and enabling technology research into clusters of interdependent, aligned projects – a research thrust.
- <u>Test Beds:</u> guide research activity to bring technology to proofs of principle that realize the ERC vision
  - *System test beds* prove ERC-wide technology advances
  - *Intra-thrust testbeds* prove thrust-wide enabling technology advances
- Both motivated by ERC's strategic research plan
  - Projects selected to address ERC's research/technology barriers, gaps, and requirements of engineered systems
- Interdisciplinary teams form across partner institutions
- Interdependence among projects and across thrusts

ERC Research Program:
Thrust Level Pre-Proposal Content

- Justify basic and enabling technology research in light of
  - state of the art: commercially available *and* basic research
  - barriers, gaps, or requirements the thrust will address
- Provide examples of
  - research projects and methods to be used
  - recent and targeted breakthroughs achievable in the context of the ERC's milestones
- Clarify role of the thrust in
  - contributing to enabling and systems technology test beds
  - interdependency and alignment with other thrusts

ERC Test Bed:
Qualities and Best Practices

- Enable proofs of principle at
  - technology level (within or across thrusts)
  - engineered systems level (ERC-wide)
- Test beds often need technical staff to build and operate equipment/infrastructure
- Test beds are a critical part of the education and innovation ecosystem of an ERC
- *Systems* test beds need leaders to set goals, set deliverables from research, assure integration, and realize proofs of principle

Vision, Strategic Plan, Research
Q&A

Engineering Workforce Development

University and Pre-College Education

ERC Workforce Development:
Objectives and Features

- <u>University Education:</u> Infuses ERC knowledge into curriculum to prepare undergraduate and graduate students who are:
  - o knowledgeable in industrial practice, e.g., adept team workers, experienced in advancing technology, ethical, and entrepreneurial
  - o creative, innovative, adept communicators, and life-long learners
  - o able to integrate knowledge across disciplines to advance technology
  - o experienced in working in non-U.S. research cultures

- <u>Long-term pre-college Partnerships</u>: Up to five institutions whose STEM faculty:
  - o participate in structured engineering learning and activities
  - o integrate ERC-based course modules into their curriculum
  - o attract underrepresented groups to engineering research experiences

ERC University Education:
Infrastructure Requirements

- <u>Workforce Development Program Director</u>
  - member of ERC leadership team
  - faculty experienced in research-based pedagogical and experiential approaches to student development
  - leads planning, implementation, and refinement of workforce development in university and pre-college programs

- <u>Workforce Development Advisory Board (WDAB)</u>
  - external experts in workforce development, broadening participation, and education
  - meet annually with Center and site visit team to provide guidance to ERC workforce development plan, activities, and advances

ERC University Education:
Program Requirements

- <u>Strategic Education Plan</u>
  - aligned with plans for research, innovation, and inclusion
  - identifies research-based pedagogical and experiential approaches to achieve objectives of ERC workforce development
  - organizes integrated efforts to produce ERC graduates that meet objectives of the ERC university and pre-college programs
  - coordinates interactions between ERC, WDAB, community/technical colleges to attract and graduate minority students

- <u>Global Exchange</u>
  - Students conduct ERC-relevant research in industry and foreign labs
  - Cyberinfrastructure and student experiences enable rapid translation of ERC results across the ERC, innovation ecosystem, and nation

ERC University Education:
Program Requirements

- Skill Sets
  - ERC develops technical and transferable professional skills of ERC students
  - identifies research-based curricula, activities, mentors, etc. to impart these skills
  - 1 undergraduate student per 2 graduate students to be trained in labs

- Curricular Impact
  - modules, content, certificates, new degree programs derived from ERC
  - all partner institutions infuse engineering curricula with ERC experiences,
  - Summer REU program for non-ERC students. Minimum $42K/yr support and 6 students enrolled

ERC Pre-college Education:
Program Requirements

- <u>Engagement</u>: develop and implement innovative best practices and effective efforts to
  - teach engineering concepts derived from ERC research
  - engage ERC faculty and students to stimulate P-12 interest in engineering careers and increase diversity
  - support P-12 faculty development to sustain pre-college teaching of engineering concepts

ERC Pre-college Education:
Program Requirements

- <u>Partnership</u>: form effective, long-term partners with up to 5 pre-college institutions near the ERC that
    - support engineering research education and experiences for their faculty and students
    - introduce high school students to research in university labs
    - involve K-12 (and community college) STEM faculty in RET program to experience research
    - sustain follow-up to ensure RET experience is translated to K-12 (and community college) curricula

ERC Assessment:
Program Requirements

- Specific, Measurable, Attainable, Realistic, and Timely goals identified at Graduate and Pre-college levels

- External formative and summative evaluation of progress and achievement of goals within Center lifetime.

- External evaluations and Workforce Development Advisory Board feedback are used regularly to improve workforce development program

- Full proposal requires institutional review board approval

Engineering Workforce Development
Q&A

Broadening Participation

ERC Culture of Inclusion:
Program Requirements

- Vision
  - Compelling path to broaden participation among groups underrepresented in engineering, exceeding national averages
  - Inclusivity and diversity among faculty, students, and staff at all levels
  - Lead and all partner institutions cultivate inclusivity and diversity
- Strategic Inclusion Plan
  - aligned with plans for research, education, and innovation
  - identifies gaps, barriers, and requirements for inclusive participation
  - establishes goals, appropriate milestones, actionable plans
  - partners with existing programs and offices at lead and partner institutions to achieve positive outcomes

ERC Culture of Inclusion:
Infrastructure Requirements

- <u>Diversity Director</u>
  - member of ERC leadership team
  - staff or faculty experienced in the development, implementation, and assessment of proven activities to create culture of inclusion
  - leads recruitment-to-graduation of underrepresented groups in engineering fields among ERC participants

- <u>Workforce Development Advisory Board (WDAB)</u>
  - includes external expert(s) in broadening participation
  - meets annually with Center and site visit team to provide guidance to achieve objectives of ERC Culture of Inclusion

ERC Diversity:
Climate of Inclusion and Success for All

- **Leadership, faculty, and students** involved in an ERC are expected to be diverse in gender, race, and ethnicity (i.e., African Americans, Pacific Islanders, Native Americans, Hispanic Americans, and persons with disabilities who are U.S. citizens or Permanent Residents) at levels that exceed academic engineering-wide averages

- **At least one partner institution** serves and graduates large numbers of students majoring in engineering fields who are from underrepresented groups with a demonstrated track record of graduation

- **All partner institutions are responsible** for contributing to the diversity of the ERC

- **Foreign partners must respect the diversity of the ERC's faculty and students** and provide an inclusive research/education environment

Broadening Participation
Q&A

Infrastructure

ERC Infrastructure:
Program requirements

- Configuration
  - University partners and collaborators (domestic and foreign)
  - Affiliated U.S. institutions, e.g., federal labs, centers, institutes for innovation, manufacturing, education, etc.
- Leadership Team
- Advisory Boards
- Culture of Inclusion
- Organization and Management Systems
- Facilities, Equipment, Safety, and Headquarters
- Institutional Commitment

ERC Infrastructure:
Leadership Team

- **Director and Deputy** - Set and fulfill vision; lead strategic planning; build a diverse, committed team; allocate funds; complete reporting
- **Thrust Leaders** - Set thrust goals aligned with vision and plan; manage teams of faculty and students, integrate projects in thrust; deliver across thrusts
- **Research and Education Teams** - Faculty and students who carry out research and education projects
- **Workforce Development Program Director** - Sets vision and strategic plan; manages faculty and students to achieve goals; coordinates assessment; builds sustained partnership with departments
- **Diversity Director**- develops, implements, and assesses proven activities to create a culture of inclusion and recruit/retain underrepresented groups in engineering fields in all partner institutions.
- **Industrial Liaison Officer-** Sets strategic plan to build and nurture innovation ecosystem; manages agreement and IP process; builds and maintains membership and support; manages role of innovation partners and small firms in translational research

ERC Infrastructure:
Leadership Team (cont.)

- **Student Leadership Council (SLC) Chair and co-Chair** - Set and fulfill the SLC vision; develop SLC activities; develop and maintain SLC membership; lead and present SLC SWOT analysis; attend ERC Leadership Team meetings;

- **Administrative/Managing Director** – Day-to-day management of
  - finances and financial databases
  - information system and database for reporting
  - site visits and other events

- **Administrative and Financial Staff** - Maintain information system, financial accounting, day-to-day administration, staff assistance, etc.

ERC Infrastructure:
Advisory Boards

- **Scientific Advisory Board** –
  - external experts on fundamental and technological engineering research relevant to Center
  - selected by the ERC to provide feedback to the ERC Leadership team on research
  - meet annually with ERC and with site visit team to evaluate Center's positioning with respect to state-of-the-art and guide advances in ERC research
  - not identified in proposal/review process

- **Industrial/Practitioner Advisory Board** - explained later

- **Workforce Development Advisory Board** – explained previously

ERC Infrastructure:
Advisory Boards (cont.)

- **Dean and Deans' Council –**
  - coordinate ERC plans and policies with department/university leaders
  - oversee partnership between the ERC and contributing departments
  - assure departmental cooperation for faculty participation/rewards
  - assure cost share
  - assures cross-university partnership, agreements, and infrastructure

- **University Policy Board**
  - Coordinate plans and policies with department and university leaders and committees

ERC Infrastructure:
Management Systems

- **Management Systems** for
  - regular (e.g., annual/biennial) project selection, refinement, and sunsetting consistent with evolving ERC strategic research plan, with input from Advisory Boards, site visitors, NSF
  - resource allocation consistent with ERC vision and coordinated strategic plans
  - data reporting: information systems for inputs and outputs to reports
  - workflow coordination and communication
  - assessment/evaluation and feedback

ERC Infrastructure:
Facilities, Equipment, Safety, Headquarters

- ERC headquarters space is provided by lead institution
- Resources for ERC shared facilities, equipment, data, simulations, and testbeds provided by lead and partner institutions
- Safe laboratory environments, safety training provided to all ERC researchers in domestic and foreign labs.
- Safety is regularly monitored and assured.
- Cyberinfrastructure to facilitate collaboration is supported by staff and soft/hardware at lead and partner institutions
- Nano ERC's disseminate computational tools on Network for Computational Nanotechnology (https://nanohub.org/groups/ncn)

ERC Infrastructure:
Institutional Commitment

- ERC reports to Dean of Engineering at lead institution
- Tenure/promotion policies at all institutions support and facilitate ERCs:
  - interdisciplinary teams
  - partnerships with industry and innovation
  - diversity
  - mentoring (credit for all)
- Cost sharing sustains the ERC
  - amounts: RU/VH 20%; RU/H 15%; DRU and MastersL 10%; Bac/Diverse 5%.
  - provide full partnership in ERC vision, plans, activities in research, workforce development, and innovation to assure success

Infrastructure
Q&A

Innovation Ecosystem

ERC Innovation Ecosystem:
Purpose

- Brings industrial/practitioner perspectives to the ERC
- Accelerates the transfer and use of ERC-generated knowledge and technology in industry and practice
- Links ERC faculty and student researchers to industry

ERC Innovation Ecosystem:
Features

- Membership-based collaborative platform, governed by a membership agreement and common intellectual property (IP) terms

- Firms/practitioners strategically targeted to span the ERC's technology sector value chain

- University and/or state and local government facilitators of innovation and entrepreneurship

- Role for translational research in partnership with industry

ERC Innovation Ecosystem:
Infrastructure Requirements

- <u>Industrial Liaison Officer</u>
  - staff member, not faculty, at lead university
  - develops and cultivates ERC's innovation ecosystem
  - markets ERC to industry/practitioners, gaining financial support
  - coordinates industry/practitioner interaction with faculty, students,
  - manages other partnerships for innovation and translational research program.

ERC Innovation Ecosystem:
Infrastructure Requirements (cont.)

- **Industry/Practitioner Advisory Board** (IAB)
  - Key mechanism for industrial/practitioner collaboration for the ERC
  - Provides input to the ERC Leadership team on project selection and termination
  - Conducts annual SWOT analysis of the ERC's operations and progress
  - Meets at least twice a year, including private meeting with NSF site visit team

- **Scientific Advisory Board** (SAB) – described previously

- **University Policy Board** - described previously

ERC Innovation Ecosystem:
Program Requirements

- Strategic Innovation Plan
  - aligned with plans for research, workforce development, and inclusion
  - identifies relevant market/societal regulations, policies, practices
  - identifies tangible benchmarks for ERC progress in innovation
  - targets stakeholders to build competitiveness
  - positions ERC for disruptive impact in selected industry sector
- Stakeholder Community
  - industry, govt./non-profit practitioners, associations, civil societies, and end users that synergistically implement the ERC vision
- Innovation Frameworks
  - agreements for IPAB membership, technology transfer, intellectual property governance, conflict of interest management, etc.
  - assure consistency with NSF PAPP and CA-FATC

ERC Innovation Ecosystem:
Innovation Partner Commitments

- State and local government and/or university organizations, or venture capital (VC) firms that will:
  - Accelerate and facilitate innovation
  - Facilitate success for start-up firms
  - Provide guidance and training in entrepreneurship

Innovation Ecosystem
Q&A

Thank you for participating in the NSF 15-589 Webinar!