ERC Solicitation 13-560 Webinar Focus: Guidance for Preliminary Proposal Development

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Format and Team for the Webinar

- Webinar Team: Marshall Horner and Marcia Rawlings, EEC
- Program Level Overview
  - Lynn Preston
- Vision, Strategic Planning & Research Q&A
  - Keith Roper, ERC PD/EEC, and Lynn
- Education Q&A –
  - University – Carole Read, ERC PD/EEC
  - Pre-college – Mary Poats, RET PD/EEC
- Innovation Ecosystem Q&A
  - Deborah Jackson, ERC PD/EEC

Webinar Outline

- ERC Goals and Key Features
- Q&A by Key Feature
- Backup Slides – for clarification
  - PI and Organization Eligibility
  - LOI and Preliminary Proposal Requirements
  - Preliminary Proposal Review Process
  - Full Proposal Organizational Requirements
- Full slide set will be posted after webinar

Questions

1. You may submit your questions to ercintent@nsf.gov at any time in Webinar
   - Put key feature area in the subject heading
   - May be answered during the webinar
   - Will serve as a basis for an FAQ
2. Questions may come in live during the Q&A sessions by key feature

ERC Program Goals

Create a culture in academia that:

- Links scientific discovery to technological innovation
- Produces diverse engineering graduates who will be highly effective in industrial practice and creative innovators in a global economy
- Cultivates an innovation ecosystem in partnership with industry and other practitioners in a transformative arena

Gen-3 ERC Key Features

Strategic Research Plan and Research Program

- ***Guiding strategic engineered systems vision that***:
  - Joins fundamental, enabling technology, and transformational engineered systems research to innovation;
  - Develops an innovative, globally competitive, and diverse engineering workforce
- ***Strategic plans*** motivate and guide the research, education and diversity programs to achieve the vision;
- ***Cross-disciplinary, systems motivated research program***
  - Use inspired fundamental research and
  - Enabling and systems technology, demonstrated in academic-scale proof-of-concept test beds

Gen-3 ERC Key Features, cont.

Broadening Participation

- ***Engineering Workforce Development***
  University undergraduate and graduate education programs strategically designed to produce graduates who are:
  - Creative, adaptive, and innovative with
  - Knowledge of industrial practice, technology advancement, entrepreneurship, and innovation
  - Infusion of ERC knowledge into the curriculum
- ***Engineering Workforce Development***
  Long-term pre-college partnerships:
  - Bring engineering concepts and experiences to the K-12 classroom and increase enrollment in college-level engineering degree program

Gen-3 ERC Key Features, cont.

- ***Innovation Ecosystem –***
  - Brings industrial/practitioner perspectives to the ERC and accelerates the use of ERC-generated technology in industry and practice, through pre-competitive & translational research
- ***Infrastructure***
  - University partners and collaborators (domestic and foreign)
  - Cross-Disciplinary team
  - Strategic plans for a culture of inclusion and success for all
  - Organization and management systems
  - Facilities, equipment, and headquarters
  - Institutional commitment for cost sharing and other means to assure success

ERC Construct Requires the ERC Team and University Partners to:

- Achieve a well-defined engineered systems vision
- Merge the fundamental culture of academe with the systems/technology culture of industry
- Select research projects through a strategic plan
- Function with an interdependent cross-disciplinary research culture
- Integrate research and education
- Provide an industry/practitioner friendly innovation ecosystem
- Assure a culture of inclusion and success for all
- Function with collaborative faculty and university partnerships and a supportive infrastructure

Preliminary Proposal - Brief

- Opportunity to submit your vision and construct for an ERC without full proposal preparation burdens
- Intent is find the most compelling opportunities for new ERCs
- Review process will determine the final number of PIs invited to submit a full proposal

Brief Preliminary Proposal
Due July 30, 2013, 5:00 P.M. Local Time

- Cover Sheet ($2 for requested amount)
- Project Summary (1 page)
- Project Description (7 pages)
  - Proposing team (PI & co-PIs, no others)
  - Brief summaries of the vision, research (including 3-plane strategic plan chart), workforce development, innovation ecosystem
- Referenced cited (maximum 3 pages)
- Biographical Sketches (2-page limit for each) PI + co-PIs
- No Budget, No data management plan **(Enter Not Required)**
- 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 and Requirements

- Lead and at least one or up to four partner universities
- Partner must include participation of a minimum of three faculty and three students (degree level not specified)
- Partners must participate in all aspects of the ERC
- No other partners and no member firms, at this stage
- Partners may change from LOI to preliminary proposal submission to invited full proposal
  - Notify Lynn Preston of changes within one month of invitation to submit a full proposal
- Lead university is binding throughout the process

Lead and Partner University Eligibility

Lead U.S. University Must:

- Offer B.S., M.S., and Ph.D. engineering degree programs
- Have the breadth and depth necessary to support the proposed vision

Partner U.S. University – no degree restrictions

PI and Co-PI Limits

- PI may not participate in any other LOI or preliminary proposal, while in that role
- Co-PI may participate in more than one LOI or preliminary proposal
- PI and co-PIs may change up to submission of invited full proposal

Guidance Regarding ERC Key Features

Features Are In Full Proposal Context, Except as Noted

University Serving Large Numbers of Students from Groups Underrepresented in Engineering

- Lead or partner
- University will participate in the ERC's research, education, innovation ecosystem, and diversity programs
- Provide statistical justification of enrollment of women, persons with disabilities, and underrepresented minority students (racial and ethnic groups underrepresented in engineering)
  - who are majoring in STEM fields at rates that are significantly better than the national averages for the targeted group(s) chosen
- Count may include undergraduate & graduate students

What's an Engineered System

- Integration of components and elements that work together to perform a useful function
- New technology platform for:
  - New product line or new manufacturing processes
  - Transforming public sector, healthcare services, or infrastructure services
- Research will:
  - Address fundamental barriers
  - Include proof-of-concept test beds
  - Address factors affecting the use and effectiveness of the system

ERC Engineered Systems Vision

- Drives advances in an emerging, potentially revolutionary or transformational technology system
- Potential to significantly change current practices, establish new industries, or transform public sector services, healthcare, or the infrastructure
- Will increase national competitiveness or contribute to the solution of a major societal problem with national or, perhaps, international impact

Engineered Systems Vision Areas (NSF has no preference)

- Open Topic ERC
  - Engineered system chosen by the PI
- Nanosystems ERC
  - Engineered system 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

What doesn’t qualify?

- 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
- Proposals focused on the innovation ecosystem as an engineered system do not qualify
- Engineered systems topics that significantly overlap an ongoing or recently graduated ERCs www.erc-assoc.org, NSECs, I/UCRCs, MRSECs, STCs do not qualify

When Don’t the Vision, Strategy, and Research Fit the ERC Model?

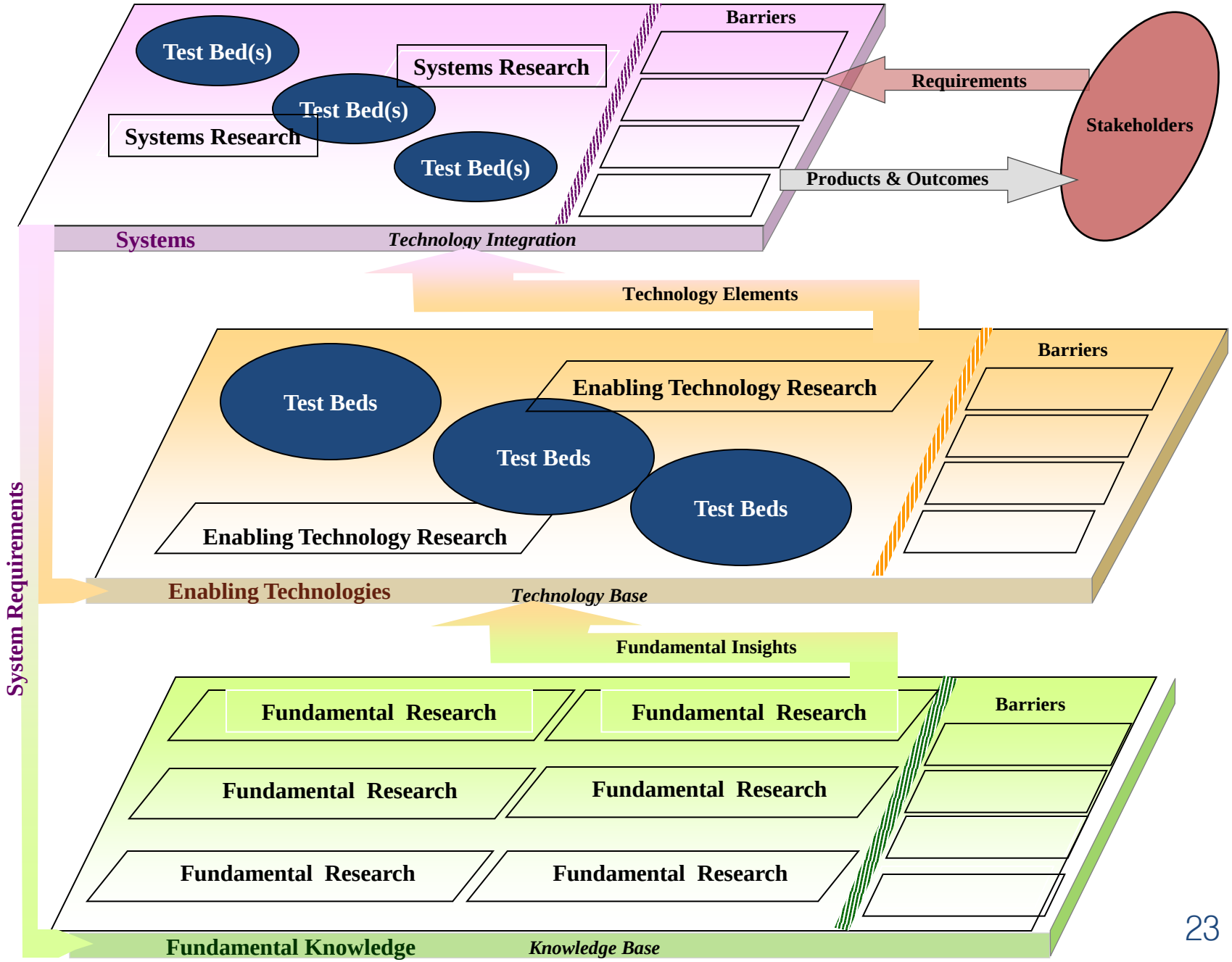
- 10-year time frame not sufficient to develop enabling technology and systems test beds
- Focus is on fundamental research and there is no integration with technology goals and innovation
- Work is incremental and little or none of it will have a transformational impact
- Intent is to channel the research results into the faculty’s start-up firms

Strategic Plan for the Preliminary Proposal

- Study the guidance and full proposal requirements
- Summarize your plan in the light of the requirements
- Include the proposed 3-plane strategic plan chart

http://www.erc-assoc.org/funding_opportunities

ERC Strategic Framework: Proposal #, PI Name, ERC Name, Lead University Name



ERC Strategic Planning and the Research Program

- Strategic planning in ERCs **demonstrates a critical path** to the realization of the system-level goals
- Plan **targets system requirements** plus enabling and systems technology goals/deliverables – with feedback loops
- **Requirements generate barriers** and knowledge gaps, informed by the state of the art and environmental, societal, and other factors
- **Requirements and barriers motivate** the selection of the fundamental, enabling technology and systems research projects and test beds
- **Research program** must include high quality projects, integrated and managed to address the barriers and achieve the goals of the ERC
- **Milestone chart** plots deliverables and interdependencies
- **Plan should be flexible and evolutionary** as advances are made and new barriers/challenges arise

Research Program – Thrusts and Test Beds

- Research program is organized into integrated thrusts or clusters of interdependent projects
- Motivated by the ERC's strategic research plan
  - Project selected to address ERC's research/technology barriers and challenges
- Cross-disciplinary teams from across the partner schools
- Interdependence among projects and across thrusts
- Test beds within thrusts (enabling technology) or stand alone systems test beds, both designed to bring technology to academic-scale proof of concept

Thrust Level Content (scale down for preliminary proposal)

- Justification for the research in light of the barriers the thrust will address and the state of the art
- Examples of the research projects and methods to be used
- Examples of targeted breakthroughs achievable in the context of the ERC's milestones
- Role of the thrust ***vis-a-vis*** enabling and systems technology test beds

Test Bed Requirements

- Proof-of-concept enabling and systems technology may take place within thrusts or as separate thrusts
- Need leaders to set goals, required deliverables from the research, assure integration and realization
- Function at an academic scale and require student involvement
- Critical part of the education and innovation ecosystem of an ERC
- Budget for technical staff to build and often operate them

Engineering Workforce Development

Broadening Participation through University and Pre-College Education

Gen-3 ERC University-level Education – "Designing an ERC Graduate"

- Determine Desired Skill Sets for an ERC Graduate:
  - Knowledgeable of industrial practice, experienced in advancing technology, skilled at working in teams, good communicators, understand entrepreneurship, creative, innovative, with global experience
- Study the pedagogical literature to determine best practice
- Develop a set of activities to "produce" graduates with those characteristics and outcome indicators
- Assure participating faculty endorse these activities
- Develop an assessment program to determine outcomes and adjust as needed

Gen-3 ERC Strategic University-level Education, cont.

- Integrate ERC-generated knowledge into the curriculum for undergraduate and graduate students
- Research training experience for graduate and undergraduate students (specialized techniques, equipment, etc.)
- ERC undergraduates involvement in research during the academic year plus summer REU for non-ERC students (REU - $42K/yr. from ERC's base budget)
- Cross-partner educational impact
- Student research opportunities in foreign university laboratories
- Internships with member firms

Gen-3 ERC Pre-College Education

Long-term Partners: Up to five pre-college institutions (school districts or individual schools), nearby lead and/or partners, mix of middle and high school teachers and students (Required at full proposal stage)

Goals: Bring engineering concepts/experience to the classroom to stimulate interest in careers in engineering and increase diversity

Means:

(1) ERC Research Experiences for Teachers (RET) for pre-college and community/technical college faculty ($84K/yr. from ERC base budget):

- Involves teachers in ERC's research labs to provide an understanding of engineering concepts
- Teachers and ERC students develop course modules to bring engineering concepts/experiences to the pre-college classroom, with follow up on translation

(2) Direct student involvement in ERCs

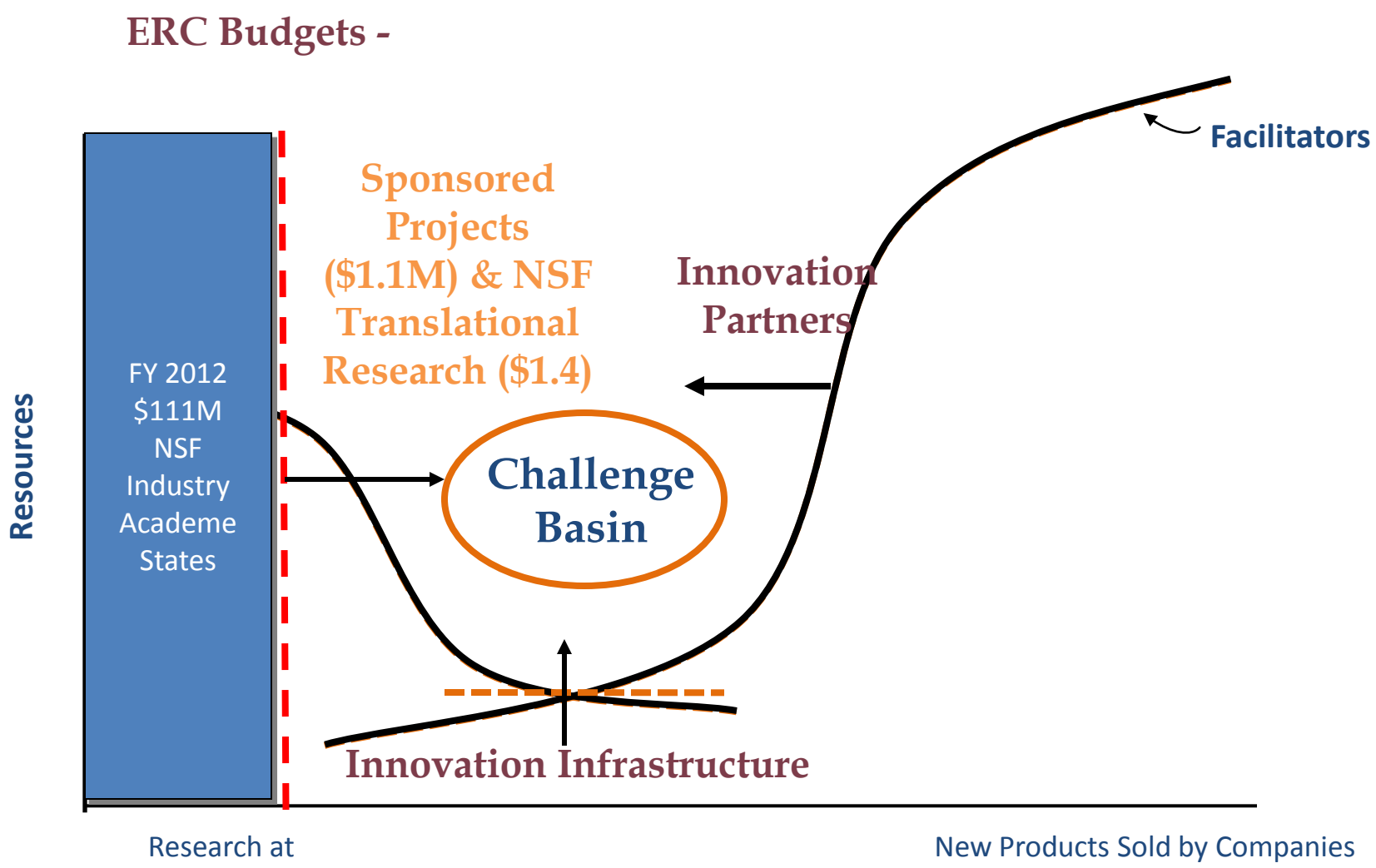
- Pre-college students engaged in ERC outreach activities
- Promising high school "Young Scholars" engaged in ERC research

Assessment: Track progress and impacts to improve

Gen-3 ERC Innovation Ecosystem

- Membership based collaboration platform
  - Draft membership agreement and discussion of IP terms, required at full proposal
  - Industrial Advisory Board, required at full proposal
- Firms/practitioners strategically targeted along the value chain (sectors only at preliminary proposal stage)
- University and/or state and local government partners/facilitators of innovation and entrepreneurship (roles only at preliminary proposal stage)
- Role for translational research in partnership with small firms

Gen-3 ERCs Convert "Valley of Death*" Into "Challenge Basin**" to Accelerate Innovation



Genesis of chart from *Angus Kingon (NC State and Brown), enhanced by
**Deborah Jackson, ERC Program Director

ERC Infrastructure at Invited Full Proposal Stage – What Lies Ahead

- Lead and up to four partner institutions,
  - One serves large numbers of students from groups underrepresented in engineering who are majoring in STEM fields
  - Foreign partner universities or collaborators
- Leadership and core cross-disciplinary faculty teams
- Culture of inclusivity
- Mentoring
- Management systems plus advisory boards
- Cost sharing and financial support from industry
- Facilities, equipment, laboratory safety procedures, headquarters
- Institutional commitment to facilitate ERC's success

Format Q&A Sessions
25 minutes each

Questions live and via ercintent@nsf.gov

- Vision, Strategic Planning & Research Q&A
  - Keith Roper, ERC PD/EEC, and Lynn
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Supplementary Information

PI and Organizational Requirements for

Letter of Intent

and

Preliminary Proposal

Lead and Partner University Eligibility

Lead U.S. University Must:

- Offer B.S., M.S., and Ph.D. engineering degree programs
- Have the breadth and depth necessary to support the proposed vision

Partner U.S. University – no degree restrictions

University Proposal Submission/Award Limits

- University with more than one funded ERC in Classes of 2006-2012 by October 1, 2014 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 under NSF 13-560

University Serving Large Numbers of Students from Groups Underrepresented in Engineering

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  - who are majoring in STEM fields at rates that are significantly better than the national averages for the targeted group(s) chosen
- Count may include undergraduate & graduate students

PI Eligibility Requirements

- Tenured faculty member in an engineering department/school in the lead university
- Ph.D. in engineering or an associated field of science who has:
  - Substantial career experience in engineering, and
  - Primary appointment in an engineering department or school of engineering

Feedback from NSF
May through July

- Only one teleconference with ERC PDs
  - Send email to Lynn Preston with one page description of the ERC (lpreston@nsf.gov)
  - She will arrange for relevant ERC PD(s) to talk with your team over the phone < 1 hour
  - By the time of the teleconference the 3-plane strategic planning will be ready for discussion
  - Send set of <10 slides for discussion (Vision, strategic plan, research thrusts, workforce development (education), innovation ecosystem)

Letter of Intent (LOI) – Required in Order to Submit a Pre-Proposal

- Due May 30, 2013, 5:00 P.M. local time
- 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

LOI Submission Requirements

- Must identify lead and at least one participating partner university
- Submission of multiple letters of intent by lead university is OK
- Submission of only one letter of intent by the PI (Center Director)

PI and Co-PI Limits

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- Partners may change from LOI to preliminary proposal submission
- All eventual partners do not have to be in place

Preliminary Proposal Review Process

- LOIs will be used to form panels, groups of proposals around technology areas
- Panels will be finalized upon receipt of the proposals
- Proposals out for review in September
- Panels will be held in October
- Notification of Invitation – early November

Invited Full Proposal Organizational Requirements

- Lead and up to four domestic partner universities (one serving large numbers of underrepresented groups) that commit to cost share
- Fee paying industrial members (including practitioner organization partners as appropriate)
- Long-term pre-college institutional partners
- State/local gov. or univ. innovation partners that stimulate innovation and entrepreneurship
- Commitment to include foreign partners/collaborators (in proposal or future)

Other Full Proposal Organizational Options

- Affiliated universities/colleges/institutions that:
  - Provide faculty in groups of less than three for specific research and/or education tasks
  - Federal laboratories providing staff for specific tasks
- Community colleges and/or technical colleges that participate in the education programs

Other Full Proposal Submission Guidance

- Partners may change from LOI to preliminary proposal submission to invited full proposal
  - Notify Lynn Preston of changes within one month of invitation to submit a full proposal
- Lead university is binding throughout the process
  - Therefore, if the PI leaves the submitting university, the proposal remains with the submitting university
- PI and co-PIs may change up to submission of invited full proposal