NSF Overview and the Merit Review Process

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Program Officers
Division of Undergraduate Education (DUE)
Education and Human Resources Directorate (EHR)

Outline

- About NSF
- Merit Review Criteria & Elements
- Division of Undergraduate Education Programs
- Questions and Answers

NSF's Mission:

"…to promote the progress of science;
to advance the national health, prosperity, and welfare;
to secure the national defense..."

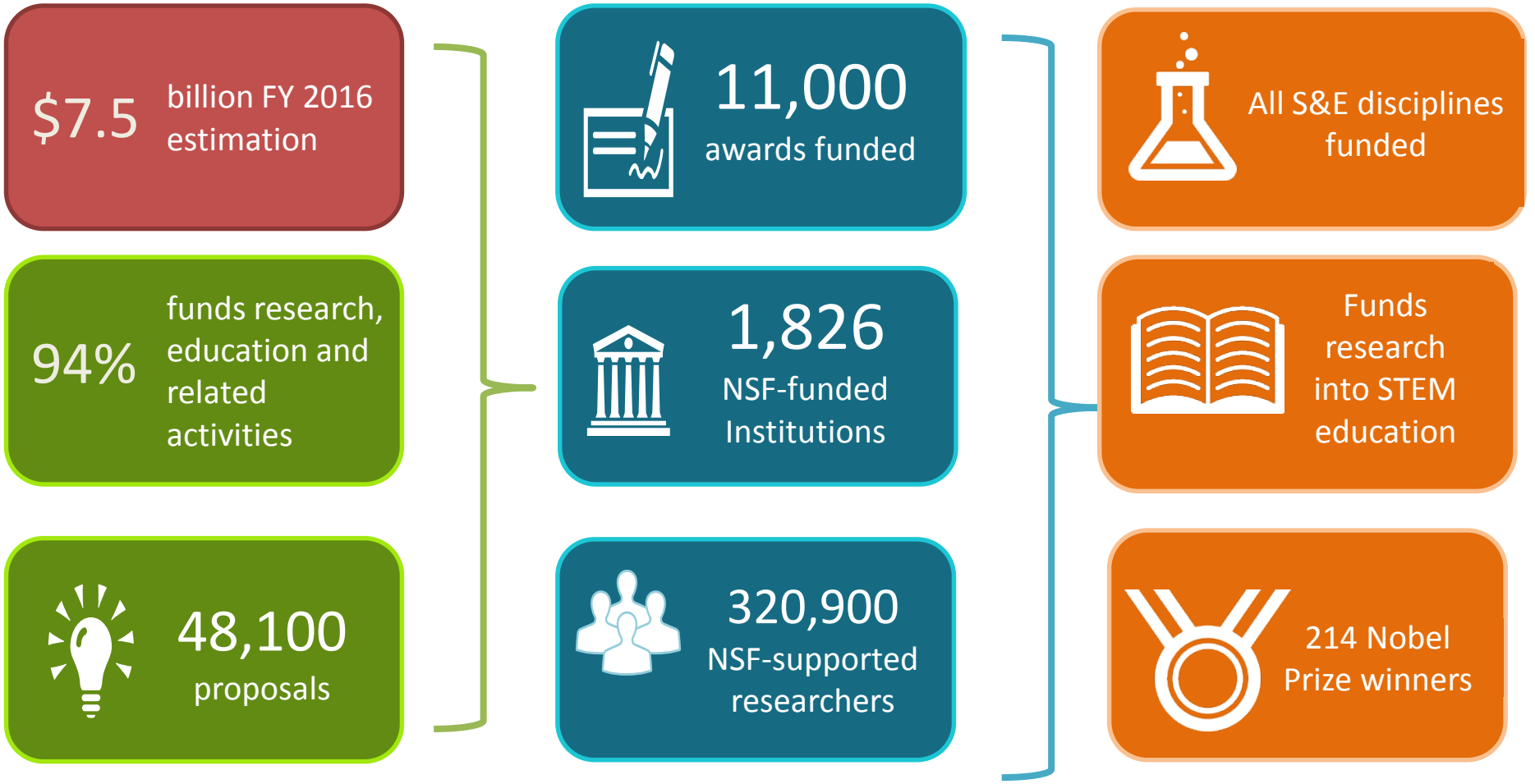
NSF Support:

- *Is a primary driver of the U.S. economy.*
- *Enhances the nation's security.*
- *Advances knowledge to sustain global leadership.*

DUE's Mission:

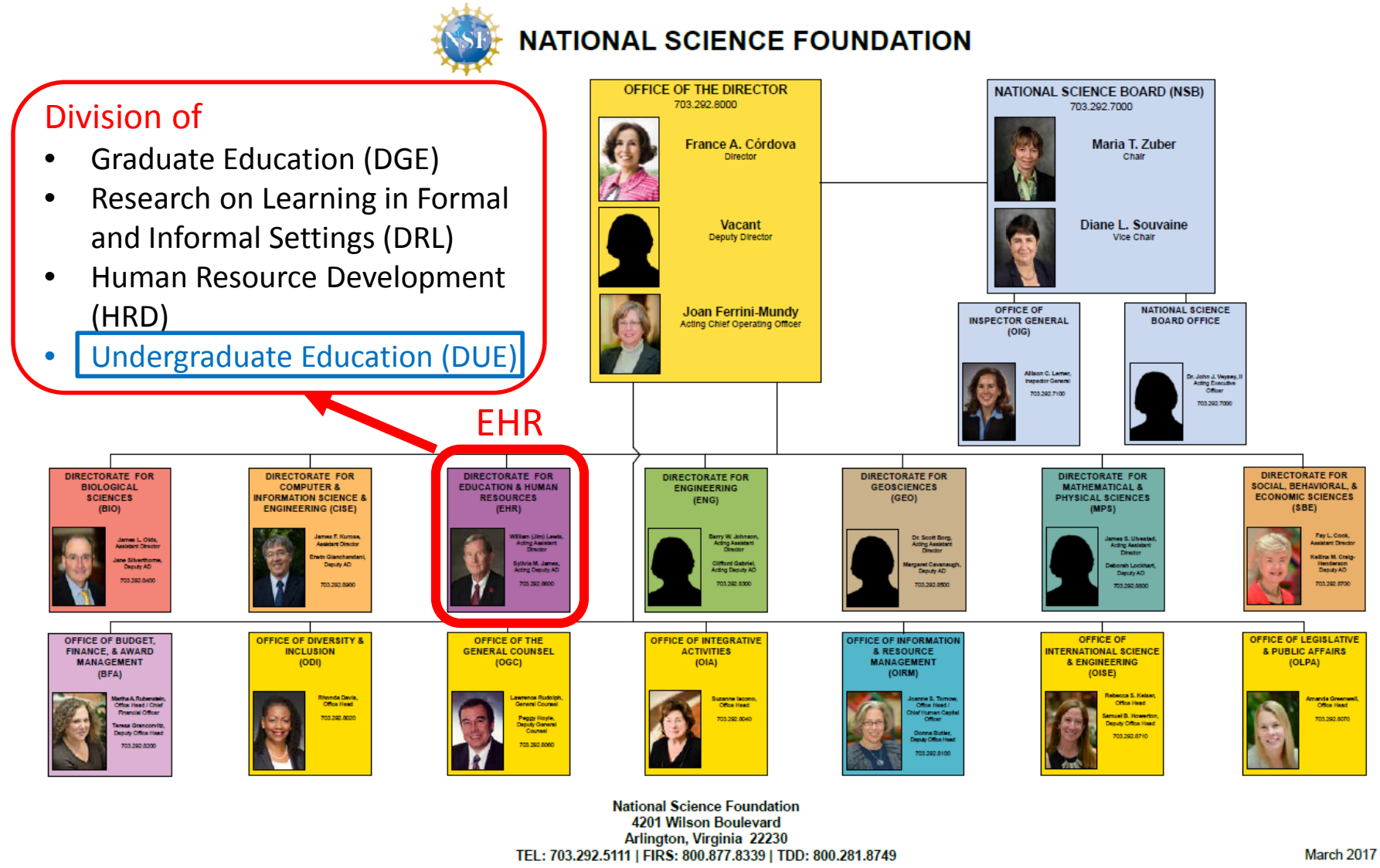
To promote excellence in undergraduate science, technology, engineering, and mathematics (STEM) education for all students.

Potentially Transformative Education R&D



NSF by the numbers

Other than the FY 2016 figure, numbers shown are based on FY 2014 activities.



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National Science Foundation
Division of Undergraduate Education (DUE)

The Merit Review Process

Proposal & Award Policies & Procedures Guide (PAPPG)

NSF 17-001

NSF has TWO Merit Review Criteria

- **Intellectual Merit (IM)**:
  - What will we learn?
  - How will it advance knowledge?
- **Broader Impacts (BI)**:
  - What will the impact be on society?
  - How will it make the nation a better place?

Educational projects sometimes have a hard time disentangling these, but you need to separate them in your proposal.

Elements of the Merit Review Criteria

1) What is the potential for the proposed activity to make a difference?
   - **IM:** By **advancing knowledge and understanding** within its own field or across different fields; and
   - **BI:** By **benefitting society** or advancing desired societal outcomes?
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 **qualified** is the individual, team, or institution to conduct the proposed activities?
5) Are there **adequate resources** available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

Questions?

NSF Programs that Support Undergraduate Education

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STEM Education Programs in DUE

- Advanced Technological Education (ATE)
- Scholarships in STEM (S-STEM)
- Improving Undergraduate STEM Education (IUSE: EHR)
- Robert Noyce Teacher Scholarship Program (Noyce)

Cross-Directorate STEM Education Programs

- Research Experiences for Undergraduates (REU: EHR)
- Faculty Early Career Development Program (CAREER: EHR)
- EHR Core Research (ECR)
- Research Coordination Networks for Undergraduate Biology Education (RCN:UBE)
- Dear Colleague Letter: Improving Undergraduate STEM Education in Hispanic-Serving Institutions

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ATE

Advanced Technological Education

BRAND NEW SOLICITATION: NSF 17-568!

ATE Program Overview

1) ATE Focuses on the education of technicians to meet workforce demands in existing and emerging advanced technological fields.
2) Colleges that award two-year degrees and their faculty must play leadership role on all projects.
3) Requires partnerships between two-year colleges and business and industry, along with secondary schools, four-year colleges and universities, and government, as appropriate.
4) Must respond to the hiring needs of for highly-skills technical workforce in the service area of the proposing institution(s).
5) Must address sustainability.
6) Read the program solicitation for more detailed information.

ATE Program

Three Program Tracks

ATE Projects

Up to $600k, up to 3 yrs

except

Small/New to ATE:

Up to $225k

ATE Centers

Two Types

National

Up to $5M

5 yrs

Resource Centers

Up to $600k

3 yrs

Targeted Research in Technician Education

From $150k, up to 2 yrs

to $800k, up to 3 yrs

Deadlines (All Tracks):

5 October 2017

ATE Project Focus Areas

1) Program Development and Improvement
2) Curriculum and Educational Materials Development
3) Professional Development for Educators
4) Leadership Capacity Building for Faculty
5) Teacher Preparation
6) Business and Entrepreneurial Skills Development for Students
7) ATE Coordination Networks
8) Small Grants for Institutions New to the ATE Program**
9) Adaptation and Implementation
10) Instrument Acquisition with Curricular Modifications to Support the Instrumentation

See ATE Solicitation 17-568 for more details!

S-STEM

Scholarships in STEM

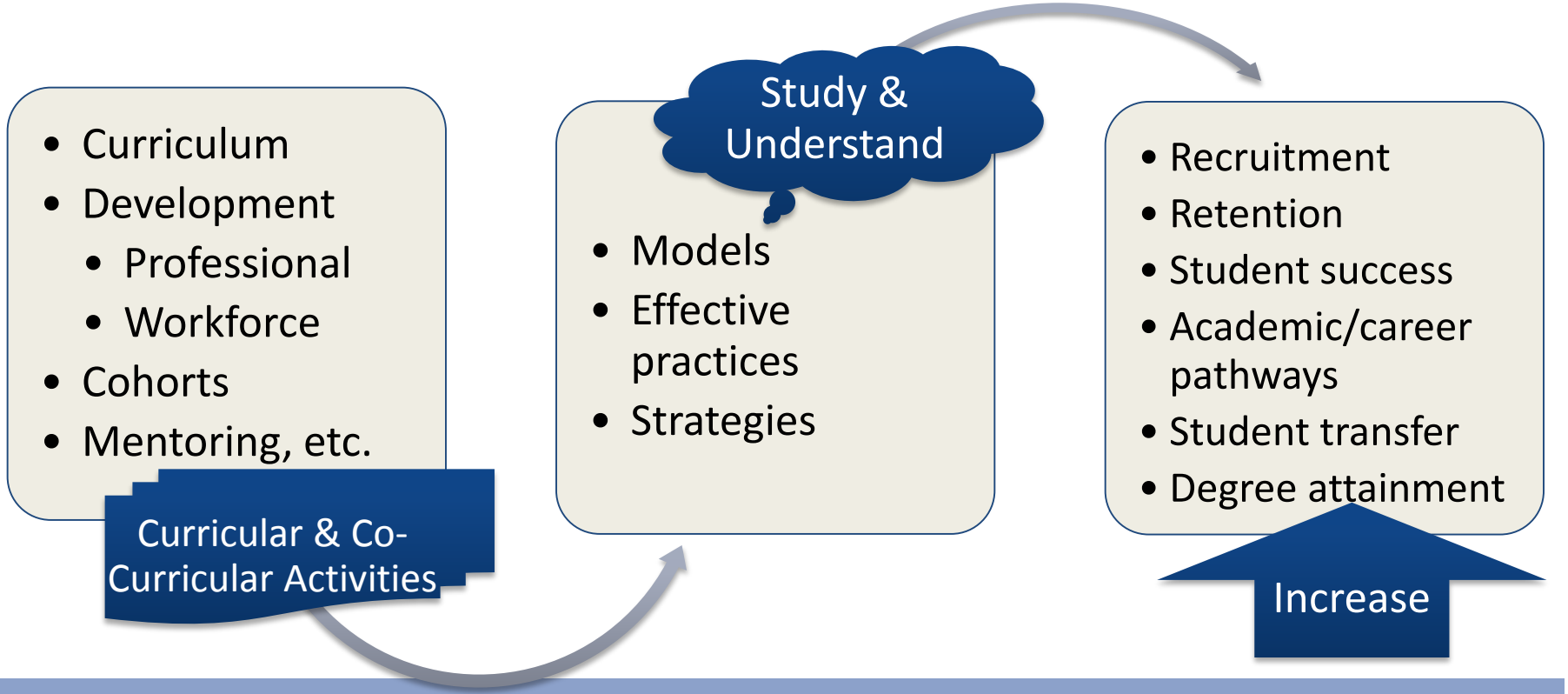
SOLICITATION: NSF 17-527

National Science Foundation
Division of Undergraduate Education (DUE)

NSF Scholarships in STEM (S-STEM) Program

Supports institutional scholarship programs for full-time, academically-talented STEM students with demonstrated financial need.

- Scholarship Amount: Up to $10,000 per student per year (depending on **financial need**)
- 60% of Budget to Scholarships – 40% to Student Support, Admin., Research, Evaluation



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S-STEM Program

Three Program Tracks

Track 1: Institutional Capacity Building → **Up to $650K, Up to 5 yrs**

For institutions without prior funding from S-STEM or STEP programs

Track 2: Design and Development: Single Institution → **Up to $1M, Up to 5 yrs**

Tracks 2 & 3 seek to leverage S-STEM funds with institutional efforts and infrastructure to increase and understand impacts

Track 3: Design and Development: Multi-Institution Consortia → **Up to $5M, Up to 5 yrs**

Deadline (All Strands and Types):
28 March 2018
Last Wednesday in March, Annually Thereafter

Management Team

Project teams composed of:

1) Faculty member currently teaching in one of the S-STEM disciplines
   - STEM disciplinary expertise

2) STEM Administrator
   - Communicate across functional units of institution

3) A researcher with experience in institutional, educational, discipline-based educational, or social science investigation at the institution or from another institution or research organization
   - Education, DBER, social science, change expertise

IUSE: EHR

Improving Undergraduate STEM Education

SOLICITATION: NSF 15-585

(expired, new solicitation expected for new fiscal year)

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Improving Undergraduate STEM Education (IUSE: EHR)

Competitive proposals should build on available evidence and theory, generate evidence, and build knowledge.

Program Goals

Improve STEM Learning & Learning Environments:	**Build the Professional STEM Workforce for Tomorrow:**	**Broaden Participation & Institutional Capacity for STEM Learning:**
Increase the number and diversity of undergraduate students recruited and retained in STEM education and career pathways through improving the evidence base for successful strategies to broaden participation and implementation of the results of this research	Improve the preparation of undergraduate students so they can succeed as productive members of the future STEM workforce, regardless of career path, and be engaged as members of a STEM-literate society	Increase the number and diversity of undergraduate students recruited and retained in STEM education and career pathways through improving the evidence base for successful strategies to broaden participation and implementation of the results of this research

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IUSE: EHR Program

Two Program Tracks

Engaged Student Learning

Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools

Two Approaches

Exploration & Design (smaller scale)

Up to $300K
Up to 3 yrs

Development & Implementation (larger scale)

Level I:
Up to $600K, Up to 3 yrs

Level II:
$600K to $2M, Up to 5 yrs

Institutional and Community Transformation

Focus on increasing the propagation of highly effective methods of STEM teaching and learning

Two Approaches

Exploration & Design (smaller scale)

Up to $300K
Up to 3 yrs

Development & Implementation (larger scale)

Up to $3M
Up to 5 yrs

Common Guidelines

- The publication, Common Guidelines for Education Research and Development, offers guidance on building the evidence base in STEM learning. Research and development efforts that increase understanding of effective undergraduate STEM teaching and learning provide the foundation for building the STEM workforce of tomorrow and improving scientific literacy.

Noyce

Robert Noyce Teacher Scholarship Program

SOLICITATION: NSF 17-541

National Science Foundation
Division of Undergraduate Education (DUE)

Noyce Teacher Scholarships

Act of Congress (2002)

GOAL: to encourage talented STEM majors and STEM professionals to become K-12 STEM teachers

Scholarship, stipend, and fellowship recipients must teach in a high-need school district for a specified number of years

Track 1 (S&S) Scholarships & Stipends	Undergraduate STEM majors and/or STEM career changers
Track 2 (TF) NSF Teaching Fellowships	STEM career changers
Track 3 (MTF) NSF Master Teaching Fellowships	Exemplary, experienced STEM teachers

Track 4 (Noyce Research) Research on the Preparation, Recruitment, and Retention of K-12 STEM Teachers

Deadline (All Tracks):
29 August 2017; Last Tuesday in August, Annually Thereafter

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REU: EHR

Research Experiences for Undergraduates

SOLICITATION: NSF 13-542

National Science Foundation
Division of Undergraduate Education (DUE)

Deadline (EHR):
23 August 2017
Fourth Wednesday in August, Annually Thereafter.

REU Foci & Funding

The Research Experiences for Undergraduates program supports active research participation by undergraduate students and involve students in meaningful ways in ongoing research programs or in research projects specifically designed for REU.

There are two mechanisms for support of student research:

(1) **REU Sites** are based on independent proposals to initiate and conduct projects that engage a number of students in research.

(2) **REU Supplements** may be included as a component of proposals for new or renewal NSF grants or cooperative agreements or may be requested for ongoing NSF-funded research projects.

BUDGET

- For summer REU projects, the total budget request--including all direct costs and indirect costs--is generally expected not to exceed **$1,200 per student per week**.
- The budget request for an academic-year REU project should be comparable on a pro rata basis.
- Projects that involve exceptional circumstances may exceed this limit.

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CAREER

Faculty Early Career Development Program

SOLICITATION: NSF 17-537

CAREER Foci & Funding

The Faculty Early Career Development Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations.

The **minimum** CAREER award size is $400,000 for a five-year period for EHR.

A list of CAREER Division/Directorate Contacts can be found on the CAREER web page at http://www.nsf.gov/crssprgm/career/contacts.jsp.

Deadline (EHR):
19 July 2017
Third Wednesday in July, Annually Thereafter

ECR

EHR Core Research

SOLICITATION: NSF 15-509

ECR Foci

The EHR Core Research program of fundamental research in STEM education provides funding in critical research areas that are essential, broad and enduring. EHR seeks proposals that will help synthesize, build and/or expand research foundations in the following focal areas:

- STEM learning, STEM learning environments,
- STEM workforce development, and
- broadening participation in STEM.

The ECR program is distinguished by its emphasis on the accumulation of robust evidence to inform efforts to

- understand,
- build theory to explain, and
- suggest interventions (and innovations) to address persistent challenges in STEM interest, education, learning, and participation.

The ECR program will fund fundamental research on: human learning in STEM; learning in STEM learning environments, STEM workforce development, and research on broadening participation in STEM.

ECR Funding Levels

Funding should align with the maturity of the proposed work, the size and scope of the empirical effort, as well as the capacity of the interdisciplinary team to conduct the proposed research:.

Level I proposals:

- Maximum award size: $500,000
- Maximum duration: 3 years

Level II proposals:

- Maximum award size: $1,500,000
- Maximum duration: 3 years

Level III proposals:

- Maximum award size: $2,500,000
- Maximum duration: 5 years

Deadline (All Levels):
Second Thursday in September, Annually.

RCN:UBE

Research Coordination Networks for Undergraduate Biology Education

NSF 15-527 (expired)

New solicitation coming soon

RCN:UBE Overview

1) Focuses on any topic likely to lead to improved participation, learning or assessment in undergraduate biology education.
2) Offered in alignment with Improving Undergraduate STEM Education (IUSE) program.
3) Support will be provided for groups of investigators to communicate and coordinate their efforts across disciplinary, organizational, institutional, geographical and/or international boundaries.
4) Intention of the program is to develop networks of institutions and investigators to share activities.
5) Both incubators and full-scale networks are supported.

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Projected Deadlines:
Incubators: January 2019
Networks: January 2019

RCN:UBE Program

Incubators

Focus on developing networks, defining goals, fostering interactions

Up to $50K
1-3 yrs

Examples

***1624169**: Environments and Metrics in Biology Education and Research. Network will address retention in STEM at Historically Black Colleges and Universities*

***1248108**: Animated Discussions: Biologists and Visual Artists Foster Learning Through Animations. Bringing together animation teams to discuss potential for a large-scale collaborative network.*

Networks

Focus on supporting actively engaged networks

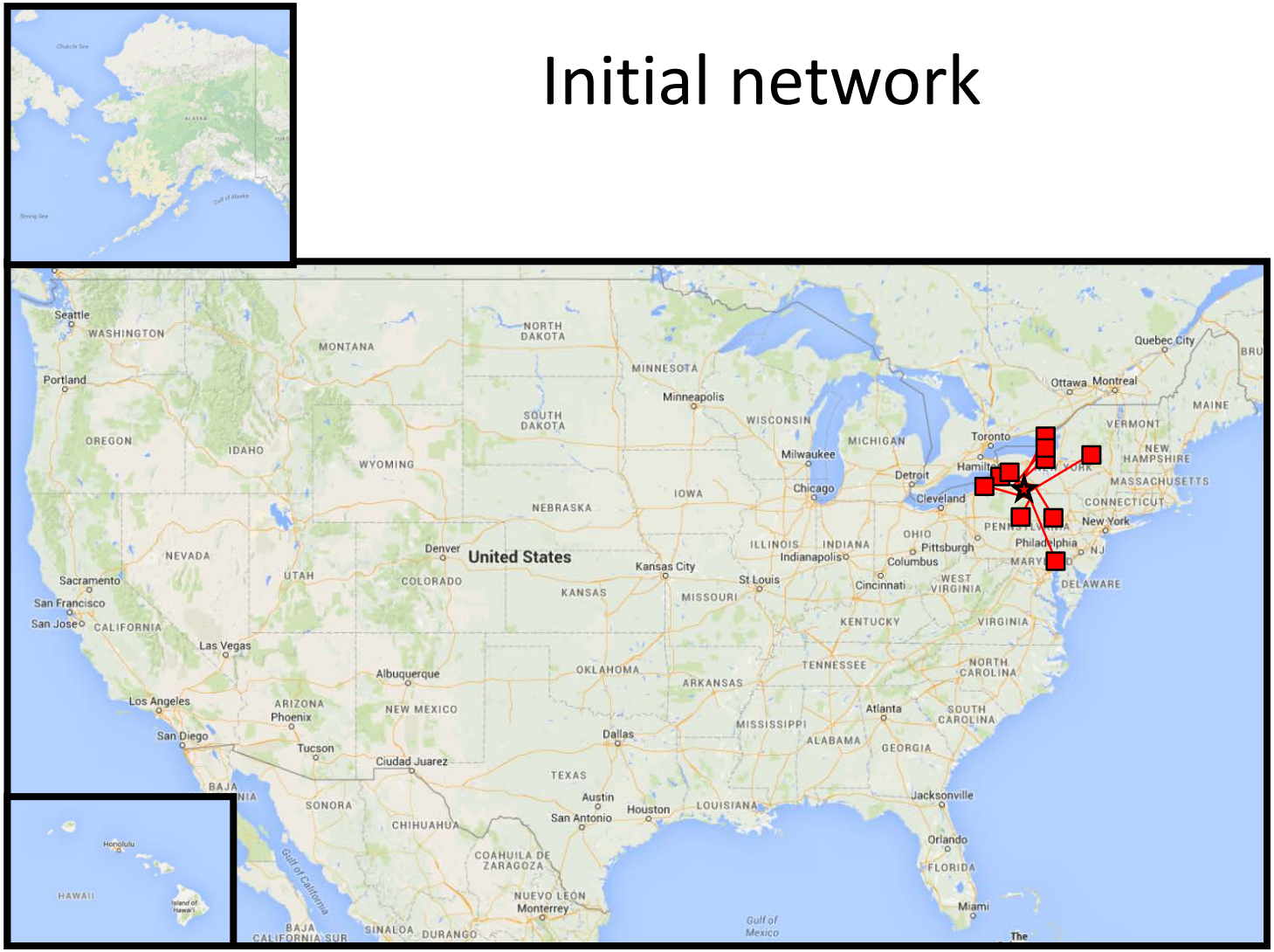
Up to $500K
Up to 5 yrs

Examples

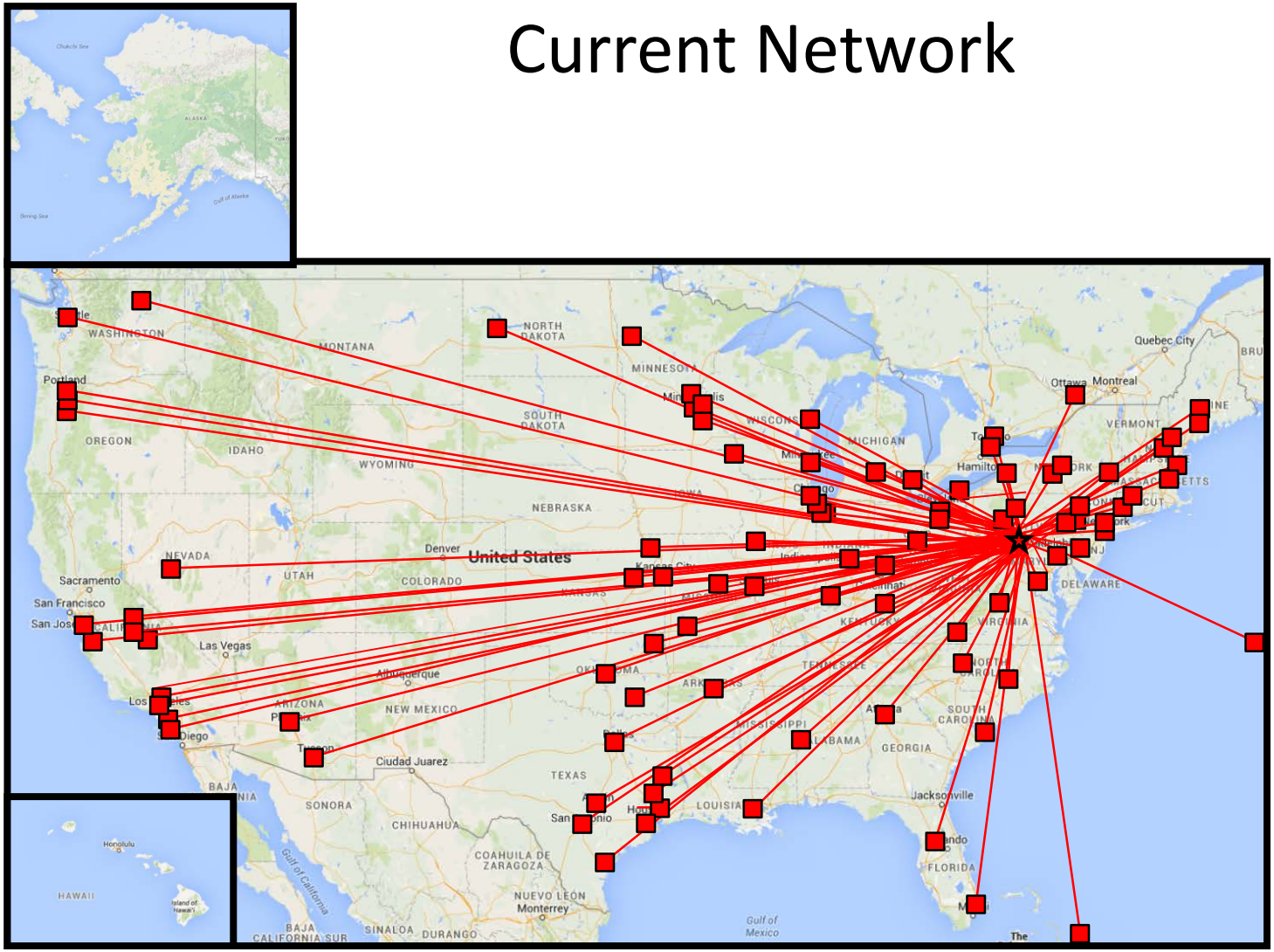
***1539900**: Network for Integrating Bioinformatics into Life Science Education. Establishing bioinformatics as an essential component of life science education*

***1624104**: The Neuroscience Case Network. Developing, using and evaluating case studies and Problem-Based Learning in neuroscience curricula.*

Initial network



Current Network



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HSI DCL

Dear Colleague Letter: Improving Undergraduate STEM Education in Hispanic-Serving Institutions

NSF 17-092

HSI DCL Overview

1) Call for submission of conference proposals to inform the design of NSF's new Hispanic-serving Institution program.
2) Intent of conferences is to identify critical challenges in STEM education at two-year and four-year HSIs, and to propose actionable solutions.
3) The proposing institution must be an HSI, but other partners are also welcome. For the purposes of this program, an HSI is defined as any institution with 25% or more undergraduate full-time Hispanic enrollment.
4) Deadline for FY 2017 – July 6, 2017.
5) Applications for FY 2018 funding accepted July 7 – September 30, 2017.

HSI DCL

Important Considerations

Intent of the workshops:	What the program will fund:	Who may apply:
To advise NSF on how to structure a targeted program to improve STEM education at Hispanic-Serving Institutions	Workshops funded at up to $100,000. Workshops should be held “early” in FY 2018	A principal investigator (or a consortium of principal investigators) at any eligible US institution. For the purposes of this DCL, a Hispanic-Serving Institution is defined as any institution that has 25% or more undergraduate full-time equivalent Hispanic enrollment

Questions?

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Division of Undergraduate Education (DUE)

National Science Foundation Proposal Writing Workshop

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Program Officers
Division of Undergraduate Education (DUE)
Education and Human Resources Directorate (EHR

Workshop Outline

- Merit Review Criteria Review
  - Intellectual Merit
  - Broader Impacts
- Mock Review
- Report Out and Debrief
- Q&A

NSF has TWO Merit Review Criteria

- **Intellectual Merit**
  - What will we learn?
  - How will it advance knowledge?

- **Broader Impacts**
  - What will the impact be on society?
  - How will it make the nation a better place?

Educationally-focused projects often have a hard time disentangling these, but you need to separate them out in your proposal.

Notes on Project Evaluation

- Evaluation monitors the progress of the project.
- It must be done by a *disinterested* third party.
- Characteristics of a good evaluation include:
  - Integrated with milestones
  - Done annually (formative evaluation)
  - Contains realistic milestones
  - Done at the end of the project (summative)
- Should consume 5-10% of the budget
- The evaluator should provide an annual report that is attached to the annual report the PI sends to the NSF.

Typical Format of a Review

- General summary of project (2-3 sentences)
- Intellectual merit
  - Strengths
  - Weaknesses/concerns
- Broader impacts
  - Strengths
  - Weaknesses/concerns
- Summary statement (2-3 sentences)

Rating the Proposal

- Excellent
- Very Good
- Good

Fund, if possible

- Fair
- Poor

Do Not Fund

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Mock Review

ATE Award 1501735

PI: Frala, Rio Hondo
Project: New to ATE

"Meeting Sustainable Technologies in Advanced Transportation and Energy (STATE) thorough Advanced Technological Education"

S-STEM Award #1643549

PI: Powell, Avila U.
Strand 1: Design & Development

"Advancing Cohorts of Excellence in STEM (ACES) Program"

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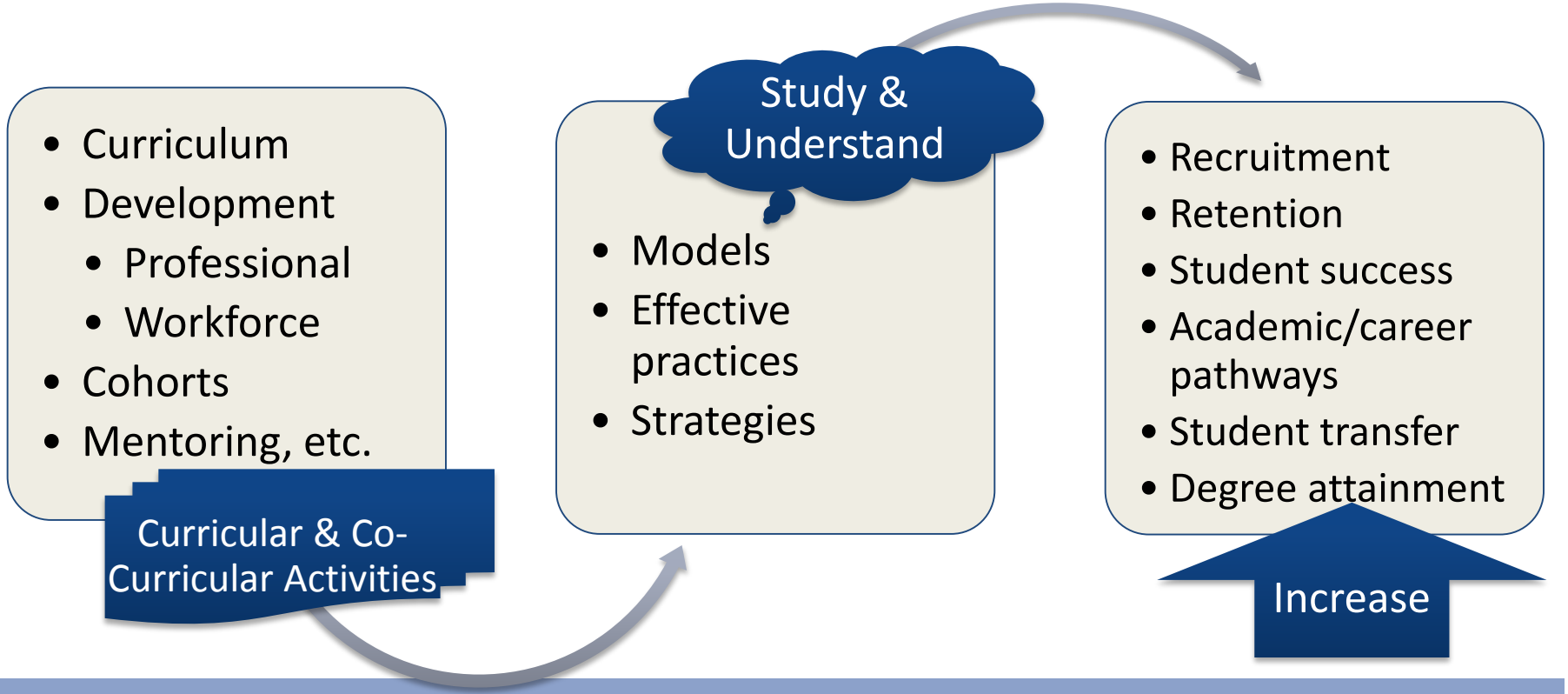

Think, Pair, Share

- **Think** by yourself for 30 min
  - Read the proposal, write down *your individual* IM & BI strengths and weaknesses, give the proposal a rating.
- **Pair** with your panel for 30 min
  - Discuss the proposal, write down *your collective* IM & BI strengths and weaknesses, maybe modify your rating.
- **Share** with everyone for 30 min

Summary of a Review Structure

- General summary of project (2-3 sentences)
- Intellectual merit
  - Strengths/Concerns
  - Support
- Broader impacts
  - Strengths/Concerns
  - Support
- Summary statement
- Overall Rating

Intellectual Merit Debrief

- What will we learn?
- How will it advance knowledge?

➢ Strengths

➢ Weaknesses

Broader Impacts Debrief

- What will the impact be on society?
- How will it make the nation a better place?

➢ Strengths

➢ Weaknesses

STEM Education in 2026

- What will STEM education look like?
- What will the STEM disciplines be?
- What kinds of jobs in STEM will graduates be offered?
- What opportunities do you see over the next 9 years?
- What challenges do you anticipate over the next 9 years?
- Who will our students be?
- What will the financial profile of the average student be?
- What will education cost?

Thank you!