EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez
EHR AC Chair

Chancellor
L.A. Community College District
New EHR Advisory Committee Member

Kaye Husbands Fealing
Professor and Chair Georgia Institute of Technology

National Science Foundation
Departing
EHR Advisory Committee Members

Roy Pea
David Jacks Professor of Education and Learning Sciences, Stanford University

Bruce Alberts
Editor-in-Chief, Science
San Francisco, California

National Science Foundation
Departing
EHR Acting Assistant Director

Jim Lewis
Expert, EHR

National Science Foundation
New EHR Assistant Director

Karen Marrongelle

National Science Foundation
EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez
EHR AC Chair
L.A. Community College District
National Academy of Education
Spencer Dissertation Fellowship Program

James Spillane

National Science Foundation
Simmons College
Vice President, Organization Culture, Inclusion and Equity

Debra Joy Pérez

National Science Foundation
NSF-Wide and EHR Public-Private Partnerships

Moderator: Evan Heit
Director of the EHR Division of Research on Learning in Formal and Informal Settings (DRL)
Ken Calvert
Division Director, CISE/CNS
Co-lead, Partnerships Agency Priority Goal Implementation Team
Co-lead, Partnerships Goal Team, Renewing NSF
Partnerships: Component of NSF Strategy

- Partnerships Agency Priority Goal
- A focus area in Renewing NSF
Background: Agency Priority Goals

• Every Federal Agency regularly establishes performance goals
  • In consultation with the Office of Management and Budget (OMB)
  • Some are designated as Agency Priority Goals (APGs)
• For FY18-19, NSF has one Priority Goal (established Fall 2017):
  Expand public and private partnerships to enhance the impact of NSF’s investments and contribute to American economic competitiveness and security.
  By September 30, 2019, NSF’s number of partnerships and/or award actions with other federal agencies, private industry, and foundations/philanthropies will grow by 5 percent, relative to the FY 2017 baseline, to make available infrastructure, expertise, and financial resources to the US scientific and engineering research and education enterprise.
APG Structure and Overall Strategy

NSF will pursue the APG by implementing a strategic vision for future partnerships that builds upon existing and emerging experience. NSF will enhance and expand its investments along three axes:

- research and innovation;
- research infrastructure; and
- workforce development.

Along each axis, NSF will pursue a staged strategy aligned with its mission. The stages of this process include:

1. Strategically identify opportunities with potential partners (e.g., workshops, meetings, other outreach).
2. Work externally as well as internally to efficiently formalize partnerships (e.g., formulate and sign MOUs, streamline MOU processes internally).
3. Implement partnerships (e.g., issue new or updated funding opportunities, make awards, execute agreements).
Partnerships APG Working Group

• Step 1: Determine scope of the 5% target
  • Define "Partnerships and/or award actions" to be included
    Activities with at least one domestic partner, where:
    Formal agreement existed AND funds flowed in FY17
    OR
    Formal agreement was created in FY17

• Step 2: Inventory partnerships across NSF to establish baseline

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Renewing NSF

From the FY19 Budget Request to Congress:

"As part of its Agency Reform Plan, NSF will initiate operational reforms in four areas in FY 2019: (1) make information technology work for us, (2) align NSF’s workforce and work, (3) expand public and private partnerships, and (4) streamline, standardize, and simplify programs and processes."

"Renewing NSF" is the Agency's response to Executive Order 13781 (March 2017)
Renewing NSF: Implementation strategy

1. **Steering Group:** Strategic Leadership and Vision, Integration, and Governance

   - **Leadership**
   - **Communications**
   - **Agency Engagement**
   - **Budget**
   - **Evaluation & Performance**

2. **Goal Teams:** Goal Accountability and Implementation

   - Making IT work for us
   - Adapting NSF’s work and workforce
   - Streamlining, standardizing, and simplifying programs and processes
   - Expanding and deepening public-private partnerships

3. **Implementation Teams:** Project-Level Execution

   - Partnerships APG Team
   - New projects and groups
Partnerships Goal Team

• Formed June 2018
• Initial SWOT analysis
• Development of Vision for NSF's Partnerships
  • Key Elements
  • Challenges/Opportunities
  • Bold Steps
Partnerships Goal Team

• Key Elements
  • Global leadership in impact catalyzed by partnerships
  • Guided by unified strategic vision
  • Streamlined, flexible mechanisms
  • Systematic, continual assessment of success metrics

• Example Challenges
  • Operating within Federal context/constraints
  • Overburdened workforce

• Example Opportunities
  • NSF's "Gold Standard" merit review process
  • Administration interest in public-private partnerships

• Example Bold Steps
  • Develop framework/method for identifying advantageous partnerships
  • Build a partnerships toolbox
Partnerships APG Current Activity

• Collecting "Best Practices" from across the foundation
• Developing "MoU Tool" to help streamline approval process
Partnership Examples from Baseline

• CyberCorps™ Scholarships for Service (NSF 17-556)
  • Lead Directorate: EHR
  • Partners: DHS, OPM, NSA

• IDEAS Lab on the Physics of Cancer
  • Lead Directorate: MPS
  • Partner: Stand Up 2 Cancer

• Software-Defined Infrastructure as a Foundation for Clean-Slate Computing Security (NSF 16-582)
  • Lead Directorate: CISE
  • Partner: VMware
Partnerships APG
Implementation Team
Ken Calvert, Jim Deshler, Meghan Houghton, Tara Bracken, Clark Cooper, Teresa Davis, Darren Dutterer, Anne Emig, Jean Feldman, Soo-Siang Lim, Leah Nichols, Karen Santoro, Lee Zia
Also: Amber Baum

Renewing NSF
Goal Team
Ken Calvert, Barry Johnson, Carl Anderson, Erin Dawson, Anne Doyle, Theresa Good, Tony DiGiovanni

THANKS!
EHR PPP Activities

Sarah-Kay McDonald
Senior Advisor, EHR office of the Assistant Director
EHR Public-Private Partnership Activities

Session 1, EHR AC meeting — Thursday October 18, 2018
Partners’ roles in accomplishing EHR goals

- Partners provide **perspectives & expertise**. Drawing on these resources, partners’ advice helps:
  - Identify (emerging) challenges
  - Establish priorities, set agendas
  - Model approaches, develop strategies

- Partners can provide **other resources** e.g.,
  - Internships & other training opportunities
  - Access to subject matter experts
  - Data, tools
  - Funds

- Partners can engage in **synergistic activities**.
EHR: Catalyzing & supporting partnerships

Advanced Technological Education (ATE)

- Involves partnerships between academic institutions (grades 7-12, IHEs) & industry to promote improvement in the education of science and engineering technicians at the undergraduate and secondary institution school levels.

- Encourages partnerships with other entities that may impact technician education (e.g., NIST, Manufacturing USA Institutes, IMCPs).

Leveraging resources to accelerate innovation

- Graduate Research Internship Program (GRIP)
- Graduate Research Opportunities Worldwide (GROW)
- National Science Foundation Research Traineeship (NRT)
- CyberCorps® Scholarship for Service (SFS)
- Non-Academic Research Internships for Graduate Students (INTERN)

Providing STEM workforce development opportunities
Leveraging resources to accelerate innovation

**Science Learning+ Partnership Grants** (AISL)

- International partnership between NSF and the Wellcome Trust with the UK Economic & Social Research Council (ESRC).
- Required collaborations between at least one organization in the U.S. and one in the UK/Republic of Ireland.
- Designed to increase partnerships, understanding, and influence between STEM education/learning researchers and practitioners, and to develop collaborations among institutions & individuals engaged in informal STEM experiences.

Source: [https://wellcome.ac.uk/funding/science-learning](https://wellcome.ac.uk/funding/science-learning)
Leveraging resources to accelerate innovation

Science Education Alliance Phage Hungers Advancing Genomics & Evolutionary Science in Tribal Colleges & Universities (SEA-PHAGES in TCUs)

• Novel partnership with the Howard Hughes Medical Institute.

• TCUs apply to the HHMI Science Education Alliance.

• HHMI provides the support to TCUs it provides to all SEA institutions.

• NSF’s Tribal Colleges and Universities Program (TCUP) accepts proposals to enable participation in the SEA-PHAGE program.

Source: https://seaphages.org
Leveraging resources to accelerate innovation

**Graduate 10K+ (STEP special funding focus)**

- Cooperative activity between NSF and members of the President’s Jobs Council’s High Tech Education working group.
- Funded with $10 million in donations from Intel and the GE Foundation, & a generous personal donation.
  - A 2013 Graduate 10K+ award established the Washington STate Academic RedShirt program in engineering (STARS) to help level the playing field for engineering students.
  - Building on the success of the “Washington STARS” model, in 2016 the NSF Scholarships for STEM (S-STEM) program supported the Redshirt in Engineering Consortium.
  - Last month Amazon announced $1 million in additional funding for consortium member University of Illinois.

Leveraging resources to accelerate innovation

Last month, NSF & Boeing announced a new partnership to accelerate training in critical skill areas & increase diversity in STEM fields.

- Supported by $10 million in funding from Boeing, NSF will invest in the design, development, & deployment of online curricula at the community college, undergraduate, graduate, and professional levels.
- To complement Boeing’s investment, EHR will invest $10 million for research focused on reskilling & increasing the technical abilities of the U.S. STEM workforce.
- An additional $1 million Boeing gift to NSF INCLUDES focuses on increasing the number of women in STEM fields.

EHR Public-Private Partnership Activities

Strategies and opportunities for the future
NSF INCLUDES and PPP

Sylvia James
Acting Deputy Assistant Director, EHR

Monya Ruffin-Nash
Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL)
NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science
NSF INCLUDES MOU with Boeing

- Boeing is the first corporation to contribute to NSF INCLUDES nationally
- The Boeing $1 million gift will be used to target women, especially women veterans, returning to the STEM workforce
- A Dear Colleague Letter will be released in fall 2018
GOAL: To identify existing mechanisms and generate innovative new ways that funding agencies can collaborate through interagency and public-private partnerships that advance broadening participation goals in federal STEM education including through the NSF INCLUDES National Network.
Funders Collaborative Meeting
October 25-26, 2018

Day 1 for Federal agencies: 18 Federal agencies & NSF INCLUDES teams, interested staff

Day 2 for Federal agencies, STEM funders, and guests: STEM Funders Network Executive Committee, member organizations and 30 organizations such as foundations, community-based organizations, academic institutions, and informal science education institutions

Co-hosted by NSF INCLUDES & the STEM Funders Network
Discussion questions

- How might EHR’s participation in PPP expand support of STEM education research and development?

- How might PPP serve NSF INCLUDES in building a national network for funders dedicated to collective impact around broadening participation and institutional capacity? What does it mean to be a part of a national network?

- How might PPP support the integration of STEM education R&D and STEM research?

- Are there questions or comments about this session that you’d like to discuss with NSF leadership?
Morning Break
10:30 – 10:45AM
STEM Workforce Development

Moderator: Lee Zia
Deputy Director, EHR Division of Undergraduate Education (DUE)
**Background**

- EHR supports Workforce Development throughout all of its divisions

- Training and research: NSB and White House efforts to strengthen the STEM workforce.

- From the future of work to the work of the future
National Science Board (NSB)  
Task Force on the Skilled Technical Workforce  

Matt Wilson  
NSB Policy Director (Acting)/Science & Engineering Policy Analyst
The STW and the U.S. Economy

- The STW is a large, diverse, and growing segment of the STEM workforce.

- Mirrors U.S. population demographics: 13% black, 10% were Hispanic, 4% were Asian, and approximately 11% were foreign born (2015).

- In 2015, STW median earnings in S&E ($60,000) or S&E related ($45,000) occupations higher than median earnings in other occupations ($29,000).

- Many occupations with large numbers of skilled technical workers—such as occupations in information technology and health care sectors are among the fastest growing.

- Skilled technical workers are highly sought after, employers in 80% of local areas said they had trouble filling jobs in occupations that depend on these workers.
White House Priority: STEM Education and the American Worker

• Executive Order Establishing the National Council for the American Worker issued on July 19, 2018.
  • NSF Director one of the 10 Council members.

• The council shall develop recommendations for:
  • A national strategy on cross-sector collaboration to promote workforce development and provide affordable education and skills-based training.
  • Work with agencies to foster consistency in implementing policies and actions developed under this order.

• Initial Tasks (within 180 days)
  • Develop a national campaign to raise awareness of skills crisis, and STEM education.
  • Plan to recognize companies that demonstrate excellence in workplace education, training, and retraining;
  • Examine how Congress and the executive branch can work with other sectors...
Innovations in Mentoring, Training, and Apprenticeships Act

• Bi-partisan bill passed the House on September 26, 2018.

• Directs NSF to
  • Coordinate with other relevant federal agencies to avoid duplication, and enhance the effectiveness
  • Grants for associate degree programs in STEM fields in in-demand industry sector or occupation
  • Support research on post-secondary courses...improve high-school level career and technical education...broaden participation...
  • Additional research shall be conducted on the efficiency of skilled technical labor markets (including survey by NCSES).
NSB Task Force on the Skilled Technical Workforce

• Formally established on November 9, 2017

• Charged to identify the opportunities and challenges facing students, incumbent workers, businesses, educators, and others involved in the STW and recommend to the NSB strategies, including possible polices, for strengthening it.

• Linked to NSF’s mission to support “...programs to strengthen scientific research potential and science education programs at all levels ...” [42 U.S.C. § 1862(a)(1)].
The number of jobs in the United States requiring substantial science, technology, engineering, and mathematics (STEM) expertise has grown nearly 34% over the past decade. As of 2015, nearly one in seven workers with at least a four-year degree say that their job requires a “bachelor’s level” of STEM expertise.1 Another 16 million skilled technical jobs—more than one in nine—do not require a bachelor’s degree, yet require significant expertise in at least one technical field.2

At the same time, other countries are challenging U.S. leadership in science and technology. Between 2000 and 2014, the number of Americans with a four-year degree in S&E grew by 53% (483,764 to 741,763); in China, this number was 360% (359,478 to 1,653,565).3 China’s investments in higher education and research and development (R&D) have fueled the rapid growth of its high-technology industries.4 Their high-tech manufacturing output now ranks number two in the world, trailing only the U.S.5 China is not alone—other countries are increasing investments in R&D and education to compete with the U.S. (Figure 1).6

As science and technology transform our economy and global competition grows, our Nation must focus on its greatest asset—our people. The U.S. can no longer rely on a distinct and relatively small “STEM workforce.”7 Instead, we need a STEM-capable U.S. workforce that leverages the hard work, creativity, and ingenuity of women and men of all ages, all education levels, and all backgrounds.8 We need scientists searching for cures for genetic disorders, engineers revolutionizing and securing our electrical grid, skilled technicians improving the operations of our research facilities and hospitals, and farmers producing healthier crops utilizing new technologies that at the same time consume fewer resources.
Task Force Activities and Strategy to Date

• Listening Sessions
  • Baton Rouge, LA
  • Warren, MI
  • Community College Innovation Challenge
  • Florence, SC
  • ATE PI Conference (October 25)

• Multiple Board Meetings

• Congressional Testimony/Discussions

• Presentations

• Stakeholder Discussions
Task Force Priority Areas

• Gathering and reporting high-quality, policy-relevant statistical **data** on the STW;

• Engaging in sustained strategic **communication** to highlight the importance of the STW and the contribution of these workers to S&T progress, economic prosperity, security, and other national goals; and

• **Convening** stakeholders to identify strategies to address persistent barriers affecting the STW...
Getting the Message Out...
Reskilling America’s Workforce: Exploring the Nation’s Future STEM Workforce Needs: A Spotlight on Engineering and Advanced Manufacturing

Robin Wright
EHR Division of Undergraduate Education, Division Director

National Science Foundation
Do you remember when...
In the context of STEM education

Do you remember when...
Council of Economic Advisers

CEA Report: Addressing America’s Reskilling Challenge

Issued on: July 17, 2018

Renewed economic growth, a booming job market, and the evolving nature of work are transforming the face of the labor market, resulting in changes in the skill needs of American employers, as well as new and different opportunities for American workers.

In the United States, investment in skill development is largely “frontloaded” during the first 25 years of life. After that, public contributions to formal education are substantially smaller, and employer training represents the most sizable investment in further developing the skills of the American workforce.

Additionally, there is an information gap between employers, workers, and educational institutions. While employers presumably know which skills they value in an employee, workers themselves and educational institutions have less up-to-date knowledge, and their response lags behind the changing demand.
Reskilling America’s Workforce: 
Exploring the Nation’s Future STEM Workforce Needs
A Spotlight on Engineering and Advanced Manufacturing

National Science Foundation
2415 Eisenhower Avenue, Rooms 2010/2020/2030
Alexandria, VA 22314
September 24-25, 2018
Participants included more than 160 people, representing many sectors.

- Business & industry
- Professional & scientific societies
- Higher education
- Research and Analysis Organizations
- Government (local, city, state, federal)
Selected Speakers

Joseph Aoun, President of Northeastern University

Scott Ralls, President, Northern Virginia Community College

Rosalin Acosta, Secretary of Labor, State of Massachusetts

R. Kirk Jonas, Director, NGA Best Practices, National Governor’s Association

Jeff Weld, Senior Policy Advisor, OSTP

Merideth Hatch, Senior Associate Director, Achieving the Dream

Ardine Williams, VP, People Operations, Amazon Worldwide Operations

Michael Carren, Head of Corporate Responsibility, The Guardian Life Insurance Company

Mike Mariner, Cofounder, Roadtrip Nation

Kennan Jarboe, Senior Program Officer, Manufacturing, Design, and Innovation, NAS

Stephanie Marken, Executive Director of Higher Education Research, Gallup
NSF Investments in workforce development were highlighted.

Directorate for Education and Human Resources

- Advanced Technological Education Program (Thomas Higgins)
- Division of Graduate Education (Nimmi Kannankutty)

Directorate for Engineering

- Division of Industrial Innovations and Partnerships (Barry Johnson)
- Division of Engineering Education and Centers (Don Millard)
Roundtable Discussions

How can we build talent pathways through industry-recognized credentials?

How can we ensure access and equity in the STEM and digital skills workforce?

What are effective pathways and policies for the STEM and digital workforce of the future?

How can we reskill the engineering and advanced manufacturing workforce?

How do we develop an employee-driven agenda?

In what ways are two- and four-year institutions working effectively to build regional talent hubs?
First Impressions
Next steps: Additional workshops focused on other areas of particular workforce needs
Next steps: The AC’s STEM Education of the Future Subcommittee is working on related issues.
Discussion: Do we need to reinvent STEM education so our country continues to be the world’s engine of innovation and opportunity?
Lunch 11:30 – 11:50AM

Please proceed to the cafeteria around the corner to purchase lunch and return for discussion.
Discussion questions

• STEM Workforce Development is one of EHR’s pillars. What does EHR need to do to position itself to lead in developing the STEM workforce of the future?

• Given the update on the Reskilling American’s Workforce workshop, what next steps should EHR take to follow up on the momentum of this workshop?

• How might EHR frame a research agenda around (continual) workplace learning?

• Are there questions or comments about this session that you’d like to discuss with NSF leadership?
NSF Big Idea: What is Mid-Scale Research Infrastructure and How Might it Benefit EHR Communities?

Moderator: Karen King
Program Director, DRL and Co-Executive Secretary, Committee on Strategy for National Science Board
Mid-scale Research Infrastructure

Jim Ulvestad
Chief Officer for Research Facilities
October 18, 2018
A Neglected Scale of Infrastructure

We have a gap

Equipment for IIA
Equipment for small groups
... MRI

$4M

$100M

Major Research Equipment and Facilities Construction (MREFC)

Crim & Kurose, NSB, November 2015

Photo Credit: Nathan D. Holmes
• 2011 report on mid-scale instrumentation in response to America COMPETES Act of 2010.

• “the Board does not recommend that NSF expand existing Foundation-wide programs or create a new Foundation-wide program for mid-scale instrumentation at this time.
Examples of Community Calls

- NSB 2002
- NAS 2006
- NAS 2010
- HEPAP 2014
- NSAC 2014
- CISE-AC 2014

Report to of the CISE-AC Midscale Infrastructure Committee
May 2014

Crim & Kurose, NSB, November 2015

Image Credit: Exploratorium.
Neglected but not ignored
Limited funding carved out of existing budgets

Global Environment for Network Innovations (CISE) $30M

Xenon 1T Dark Matter Project (MPS/PHY) $12M

A-10 Storm Penetrating Aircraft (GEO/AGS) $13M

Crim & Kurose, NSB, November 2015

Missing important opportunities
The ways of doing science are changing - particularly with respect to infrastructure

- Increasing reliance on cyberinfrastructure
- Increasingly diverse scales (space, $, time)
- Increasingly dynamic

Issues

- Funding
- Agility – shorter timescales
- Matching oversight to scale
- Rapidly evolving technologies
- Varied operational models

How do we innovate to meet these evolving needs?
Do we need new programs and processes?

Crim & Kurose, NSB, November 2015
The NSF Big Idea on Mid-scale

MRI upper limit $5.7 million (with matching)

MREFC lower limit reduced to $70 million in late 2016
American Innovation and Competitiveness Act (AICA), Public Law 114-329, January 2017

• Section 109: NSF Mid-scale Project Investments

  • (a)(2) “Modern and effective research facilities, infrastructure, and instrumentation are critical to maintaining United States leadership in science and engineering.”
  • (b)(1) “The Foundation shall evaluate the existing and future needs, across all disciplines supported by the Foundation, for mid-scale projects.”
  • (b)(2) “The Director of the Foundation shall develop a strategy to address the needs identified in paragraph (1).”
  • (b)(4) “the term ”mid-scale projects” means research instrumentation, equipment, and upgrades to major research facilities or other research infrastructure investments that exceed the maximum award funded by the major research instrumentation program and are below the minimum award funded by the major research equipment and facilities construction program as described in Section 507 of the AMERICA Competes Reauthorization Act of 2010.”
NSF Request for Information

- Responsive to AICA, Sec. 109(b)(1), NSF issued a Request for Information on Mid-Scale Research Infrastructure, NSF 18-013, in October 2017.

- Sought input only on projects in the $20 million to $100 million range.

- ”For the purposes of this RFI, NSF defines Research Infrastructure (RI) as any combination of facilities, equipment, instrumentation, computational hardware and software, and the necessary human capital in support of the same. This includes upgrades to existing major research facilities.”

- Trying to avoid overlap and recycled “Center” proposals.
RFI Responses: 192 total, ~$10 billion

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Another NSB Report Required!

• House Appropriations language, FY 2018: “The Committee is supportive of recent actions to lower the MREFC threshold but encourages the National Science Board to consider further changes that would bridge the gap between the Major Research Instrumentation program and the MREFC account while also developing processes appropriate for mid-scale infrastructure, cyberinfrastructure, and instrument upgrades to be funded through the MREFC account. The Board shall, in collaboration with the National Academies, examine these requirements and report to the Committee within 180 days after enactment of this Act regarding its recommendations on how to address this matter within the confines of a restricted funding environment.”
“Bridging the Gap: Building a Sustained Approach to Mid-scale Research Infrastructure and Cyberinfrastructure at NSF.”

Recommendations:

- “NSF should affirm and sustain the mid-scale Big Idea with a long-term agency-level commitment to mid-scale research infrastructure.”
- “NSF should investigate the feasibility of using the MREFC account as one possible funding mechanism.”
- “NSB and NSF should review existing infrastructure oversight and management structures to ensure compatibility with mid-scale range investments.”
- “NSF, in cooperation with NSB, should develop an evaluation and assessment program to determine the full scope of the demand for mid-scale research infrastructure and ensure NSF’s programs and processes address that demand.”
## NSF FY 2019 Budget Request

### NSF’s 10 BIG IDEAS FY 2019 REQUEST FUNDING

(Dollars in Millions)

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<td>Navigating the New Arctic - NNA (GEO/ICER)</td>
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<td>The Future of Work at the Human-Technology Frontier - FW-HTF (ENG/EFMA)</td>
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<td>NSF 2026 Fund (IA)</td>
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<tr>
<td><strong>Total, NSF Big Ideas</strong></td>
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Mid-scale Working Groups

• Two working groups, covering (roughly) the funding ranges of $6-20 million and $20-70 million.
  • $6-20 million: chaired by Randy Phelps (OIA)
  • $20-70 million: co-chaired by Allena Opper (MPS) and Brian Midson (GEO)

• These working groups, with guidance from NSF leadership, are responsible for developing implementation plans.
Where Are We Now?

• Working on implementation of the mid-scale program for FY 2019.
  • Stay tuned!

• Developing further strategy, responsive to the recent NSB report, for mid-scale research infrastructure in FY 2020 and beyond.
  • There is a clear push from Congress and NSB to create a sustainable cross-NSF strategy/investment.
  • NSF has to manage carefully to ensure that the requirements of $500 million pieces of infrastructure do not get imposed on $10 million awards.
Mid-scale Research: Programmatic Experience

Allena Opper
Program Director, Directorate of Mathematical & Physical Sciences
Mid-scale Research Infrastructure: Programmatic Experience
– the experience of one PO

My portfolio:
• Experimental Nuclear Physics (ENP) Program
• ENP MRIs & ENP CAREERs
• 3 PHY Mid-scale projects
  • MUSE: $3.6M
  • LEGEND-200: NSF contribution = $7.5M, other = $30M
  • nEDM: NSF contribution = $13M, DOE contribution = $34M
  
1. PHY Mid-scale: TPC = $4 – 15 M; R&RA
2. All required years and $ from program for pre-implementation R&D
3. Coordinate and co-fund with other agencies
4. Learned a lot of project management oversight from working with DOE

• National Superconducting Cyclotron Facility (NSCL): $24M/yr
  • Identified as high priority through wide review and strategic planning exercises

Allena K. Opper  MPS/PHY

National Science Foundation
What are the pros and cons of including mid-scale research infrastructure in a program and a portfolio?

**Pros**
- Opportunity for significant impact to the field
- Stimulate future opportunities (large and small)
- Focal point for research community
- Increased visibility

**Cons**
- Challenge of identifying priorities of research community (keeping it from being a political decision)
- *Strategic* nurturing of R&D to get to “project” phase
- *Appropriate* level of review and oversight
  - TPC not the only metric
- Balance
- Increased visibility
How does a program think about operations and maintenance? Carefully and strategically

Operations and Maintenance (O&M) varies widely
- Technical personnel (machinists, vacuum tech, small and large tool tech, computational tech, data management tech, ...), standing army
- Power, water, cooling, ...
- Expendable supplies
- Scheduled maintenance of components or data

Staged i.e. start with small projects that can be upgraded

Leverage funds
- Co-fund with division
- Co-fund with other agency – but be cautious of dependencies

Awardee

Lost opportunities without investment in mid-scale infrastructure

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How do these investments affect thinking about portfolio balance and evaluating the portfolio?

Mid-scale projects add another dimension to balancing a portfolio
• Ratio of Research in Undergraduate Institutions (RUI) to non-RUI
• Balance across sub-areas of program
• Risk vs opportunity

The mid-scale dimensions:
• Potential impact to the field
  • Percentage of research community who will utilize the infrastructure (~ 1/3 of ENP community uses NSCL)
  • Impact on the field even if small percentage of community actively involved (~ 1/8 of ENP community involved in 0νββ)
• Risk – construction projects carry more risk than acquisition projects
• Cost to program (R&D and O&M)

Will the community be comfortable with trade-offs needed to gain the infrastructure?

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When is mid-scale infrastructure too “niche-y” and when is it central or scalable?

Too “niche-y” = only those people who will directly use the infrastructure appreciate the science it can enable

Central = identified by the community as a high priority
  • National Academies reports
  • Community advisory/planning committee reports
  • President’s Council of Advisors on Science and Technology (PCAST) reports
  • Caution: reports from professional societies will always ask for resources – do they prioritize those resources?

Scalable projects = good strategy
  • Clearly define infrastructure capabilities
  • Build in off-ramps
  • Discovery potential at early stages!

Allena K. Opper  MPS/PHY

National Science Foundation
The Institute for Research on Innovation & Science

Earnestine Easter
Program Director, EHR Division of Graduate Education (DGE)
“IRIS data allow observational experiments that can directly \{track\} how scientific training affects career trajectories and returns to industry.”
2018 IRIS Data Release includes
- Information on 296,000 + sponsored projects
- 478,000 + employees on those projects
- 246,000 + graduate and undergraduate students

Linkages to
- ~29,000 Proquest dissertations
- Patents & Publications (MedLine)
- 82,000 + NIH-NSF-USDA Award Abstracts
- Census Bureau earnings data (LEHD)

Census Data access through FSRDC System

IRIS Data access through Virtual Data Enclave
Organization

MEMBERS: Universities contribute data, support infrastructure and receive campus-specific and aggregate reports

NODES: Approved nodes materially improve data, develop products, and expand user communities

USERS: Approved users securely access de-identified aggregate datasets

➢ 33 universities
➢ 1/3 federal R&D spending
➢ 30% doctorate degrees
➢ 84 researchers from 21 institutions using data through IRIS Virtual Data Enclave

PARTNERS: Approved partners receive data from IRIS which they improve and make accessible through their own secure systems

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UMETRICS offers unique possibilities for examining

- Team and peer composition effects
- Scientific outcomes (Dissertations, publications)
- Non-Academic Career outcomes
- Effects of different funding mechanisms
- Gender & URM participation and outcomes

Examples

- Gender imbalanced Ph.D. programs decrease female completion rates (Bostwick & Weinberg 2018)
- Female Ph.D.s. are trained in more female dominated research teams (Buffington et al 2016)
University of Michigan Elementary Math Lab
Databrary

• Video data library/repository for social scientists
• Allows researchers to:
  • Search available video and audio clips
  • Share data to improve transparency and reproducibility
  • Archive data
  • Use data for secondary analysis
• Worldwide usage
Discussion questions

• What are potentially worthy mid-scale research infrastructure investments for EHR?

• What trade-offs or implications are important to consider before investing in mid-scale research infrastructure?

• Are there questions or comments about this session that you’d like to discuss with NSF leadership?
Mid-Afternoon Break
1:45 – 2:00PM
Recent Awards and Activities Related to Broadening Participation and Institutional Capacity

Moderator: Jermelina Tupas
Acting Director, EHR Division of Human Resource Development (HRD)
NSF INCLUDES EHR Advisory Committee Update

Sylvia James
Acting Deputy Assistant Director, EHR

Paige Smith
Program Director, Directorate for Engineering (ENG)
Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science
A comprehensive national initiative designed to enhance U.S. leadership in discoveries and innovations by focusing on diversity, inclusion and broadening participation in STEM at scale.
The Five Elements of NSF INCLUDES

- **SHARED VISION**
  - Engage the community in a shared vision

- **GOALS & METRICS**
  - Allow for evidence-based decision making

- **PARTNERSHIPS**
  - Provide a platform for collaborative action

- **LEADERSHIP & COMMUNICATION**
  - Increase communication & visibility

- **EXPANSION, SUSTAINABILITY & SCALE**
  - Establish the capacity for expansion, sustainability & scale
NSF INCLUDES History (Years 1-2)

• Year 1 (FY 2016)
  – First cohort of 40 Design and Development Launch Pilots (DDLPs, NSF 16-544)
  – 13 Conferences/ Workshops (Dear Colleague Letter 16-081) supported
  – 3-year evaluation contract for developmental evaluation with 2M/Mathematica
  – 3-year technical assistance contract with EDC/Westat/Equal Measure

• Year 2 (FY 2017)
  – First PI Meeting (January 4-6, 2017)
  – Second cohort of 30 DDLPs (NSF 17-522) funded
Design and Development Launch
Pilots were awarded grants in FY2016 and FY2017 to address broadening participation challenges such as...

- Expand access to quality STEM education (5 projects)
- Address career needs of the STEM professionals (6 projects)
- Prepare STEM educators (10 projects)
- Address students’ STEM identity, attitudes, motivation (10 projects)
- Strengthen institutional capacity (11 projects)
- Enhance support systems for undergrad and grad STEM students (20 projects)
- Provide engaging STEM activities for students and the community to promote STEM studies and careers (42 projects)

Note: Some individual projects have goals and objectives that fall into more than one category.
PARTNERSHIPS

758 partner organizations working to broaden participation in STEM through collaborative change, including...

4 libraries
13 federal/national labs & centers
58 government agencies & affiliates
94 K-12 schools & school districts
313 colleges, universities & community colleges
10 private foundations
49 professional & higher education organizations
62 corporations & corporate affiliates
107 non-profit & community organizations

...and many more
Year 3: Connecting to the NSF Portfolio

- Second PI Meeting + Center Summit (January 8-12, 2018)
- *Report to the Nation* published
- On-Ramps to the NSF INCLUDES National Network
  - 13 Supplements/EAGERS/Conferences supported (DCL 17-111)
  - NSF INCLUDES Co-funded: 3 Alliances for Graduate Education, 2 Broadening Participation in Computing and 5 Louis Stokes Regional Centers of Excellence awards
- **Coordination Hub** (NSF 17-591) awarded as cooperative agreement
- First cohort of **5 Alliances** (NSF 18-529) awarded as cooperative agreements
  - Alliances co-funded by AGEP, CREST, EPSCoR, HSI and MPS programs
The Hub will facilitate activities needed to build and maintain a strong NSF INCLUDES National Network, including communications, technical assistance and efforts aimed at increasing visibility. The Hub itself is a collaboration of multiple institutions.

**SRI International** (lead)

Westat

EQUAL MEASURE

EDC Education Development Center

Georgia Tech

ORSIMPACT (external evaluator)
The NSF INCLUDES Alliances

Computing Alliance of Hispanic-Serving Institutions
(Award 1834620; University of Texas at El Paso)

STEM Core Expansion
(Awards 1834628, 1834608)

Inclusive Graduate Education Network
(Awards 1834540, 1834528, 1834516, 1834545)

Expanding the First2 STEM Success Network
(Awards 1834601, 1834569, 1834586, 1834575, 1834595)

Aspire: National Alliance for Inclusive and Diverse STEM Faculty
(Awards 1834518, 1834522, 1834526, 1834513, 1834510, 1834521)
Boeing MOU with NSF/EHR

• Boeing is the first business to contribute to NSF INCLUDES nationally
• The Boeing $1 million gift will be used to target women, especially women veterans, returning to the STEM workforce

NSF director, France Cordova, worked on the STEM training partnership with Heidi Capozzi, senior vice president of human resources at Boeing. (NSF Photo)
Building the NSF INCLUDES National Network in Year 4 (FY 2019)

Year 4: Connecting the Network

• NSF INCLUDES Alliances and Coordination Hub Kick-off (October 3, 2018)
• STEM Funders Collaborative Meeting (October 25-26, 2018)
• Convening the NSF INCLUDES National Network (January 2019)
• Second round of NSF INCLUDES Alliances (NSF 18-529, Deadline: April 2, 2019)
• Report to the Nation 2
How might it...

- Include NSF INCLUDES Alliances, and retain Design and Development Launch Pilots and on-ramps?
- Encourage NSF awards to link to NSF INCLUDES?
- Engage organizations and individuals with/without NSF funding?
- Offer a shared repository of data, reports, research, strategies and models to address BP challenges?
- Produce a sustained commitment across all dimensions of BP?

Network Benefits could include...

- Mechanisms to engage new members
- Access to resources
- A funders collaborative to provide access to local and regional funders
- Certification as NFS INCLUDES Leaders; prizes/awards and recognition for BP work
- Training and education opportunities
- Support to replicate and adapt/adopt approaches to address BP challenges
What Should the NSF INCLUDES National Network Look Like?

How might it...

- Include NSF INCLUDES Alliances, and retain Design and Development Launch Pilots and on-ramps?
- Encourage NSF awards to link to NSF INCLUDES?
- Engage organizations and individuals with/without NSF funding?
- Offer a shared repository of data, reports, research, strategies, and models to address BP challenges?
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Network Benefits could include...

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- Training and education opportunities
- Support to replicate and adapt/adopt approaches to address BP challenges

Your Thoughts?
HBCU-Undergraduate Program: Excellence in Research (EiR) Track

Brandon Jones, Program Director, GEO
EHR Advisory Committee Meeting
October 18, 2018
HBCU Excellence in Research (EiR)

• The new Excellence in Research (EiR) component in HBCU-UP was developed in response to *Congressional mandate* to increase support for research at HBCUs.

• EiR supports projects that enable STEM and STEM education faculty at HBCUs *to conduct research* and to further develop research capacity.

• EiR aims to accelerate support of research at HBCUs *across NSF’s full portfolio*.

• Budget
  • $20 million in FY18
  • $10 million in FY19
NSF Organizations Participating in EiR

**Directorates**
- Biological Sciences (BIO)
- Computer and Information Science and Engineering (CISE)
- Education and Human Resources (EHR)
- Engineering (ENG)
- Geosciences (GEO)
- Mathematical and Physical Sciences (MPS)
- Social, Behavioral and Economic Sciences (SBE)

$ Office of Integrative Activities (OIA)
EiR Working Group

**BIO**
- Engin Serpersu
- Jodie Jawor

**CISE**
- Fay Cobb Payton

**EHR**
- Claudia Rankins
- Clytrice Watson

**ENG**
- Eduardo Misawa
- Paige Smith

**GEO**
- Brandon Jones
- Holly Barnard
- Bernard Grant

**MPS**
- Kathleen McCloud
- Guebre Tessema

**OIA**
- Randy Phelps
- Leah Nichols

**SBE**
- Kwabena Gyimah-Brempong
- Josie Welkom

*National Science Foundation*
EiR Proposal Information

• EiR is a track in the HBCU-UP solicitation (NSF 18-522)

• It is expected that there will be one competition per year in the future

• 2 award types:
  • Single investigator projects – up to $500,000
  • Multi-investigator projects – up to $1M
EiR Proposal Information

SPRING 2018
- January
  445 Letters of Intent
- March
  242 proposals

FALL 2018
- July 2018
  236 Letters of Intent
- October 2, 2018
  142 proposals
## Awards: Directorate Distribution

<table>
<thead>
<tr>
<th>Directorate</th>
<th># Awards</th>
<th>Small Award</th>
<th>Large Award</th>
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<tbody>
<tr>
<td>BIO</td>
<td>7</td>
<td>4</td>
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<tr>
<td>CISE</td>
<td>5</td>
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<tr>
<td>EHR</td>
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<tr>
<td>ENG</td>
<td>9</td>
<td>6</td>
<td>3</td>
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<tr>
<td>GEO</td>
<td>5</td>
<td>4</td>
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<td>MPS</td>
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<tr>
<td>SBE</td>
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<td>1</td>
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<td><strong>Grand Total</strong></td>
<td><strong>47</strong></td>
<td><strong>30</strong></td>
<td><strong>14</strong></td>
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## Awards: Institutional Distribution

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<tbody>
<tr>
<td>Alabama State University</td>
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<tr>
<td>Clark Atlanta University</td>
<td>$499,511</td>
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<td>Delaware State University</td>
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<tr>
<td>Florida A&amp;M University</td>
<td>$499,682</td>
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<tr>
<td>Howard University</td>
<td>$3,540,912</td>
<td>7</td>
</tr>
<tr>
<td>Jackson State University</td>
<td>$798,755</td>
<td>2</td>
</tr>
<tr>
<td>Morehouse College</td>
<td>$992,892</td>
<td>1</td>
</tr>
<tr>
<td>Morgan State University</td>
<td>$2,086,786</td>
<td>4</td>
</tr>
<tr>
<td>Norfolk State University</td>
<td>$1,949,313</td>
<td>3</td>
</tr>
<tr>
<td>North Carolina A&amp;T State University</td>
<td>$3,070,855</td>
<td>5</td>
</tr>
<tr>
<td>North Carolina Central University</td>
<td>$2,984,930</td>
<td>4</td>
</tr>
<tr>
<td>Prairie View A&amp;M University</td>
<td>$499,998</td>
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</tr>
<tr>
<td>Spelman College</td>
<td>$2,274,763</td>
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</tr>
<tr>
<td>Tennessee State University</td>
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<tr>
<td>Texas Southern University</td>
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<tr>
<td>Tuskegee University</td>
<td>$458,426</td>
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</tr>
<tr>
<td>University of the Virgin Islands</td>
<td>$498,125</td>
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<tr>
<td>Winston-Salem State University</td>
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<td>3</td>
</tr>
<tr>
<td>Xavier University (LA)</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>$25,532,261</strong></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

*National Science Foundation*
Small Award #1832065
$474,974
Morgan State University

Identification of Urban Flood Impacts Caused by Land Subsidence and Sea Level Rise for the Houston-Galveston Region
Large Award #1831013
$1,000,000
North Carolina A&T University
Radiative Effects of Biomass Burning Aerosols Laboratory and Field Measurements and Modeling of Climate and Health Impacts

Figure 1. Schematics of the Collaboration

National Science Foundation
Improving Undergraduate STEM Education: Hispanic-Serving Institutions

HSI PROGRAM UPDATE

Dr. Talitha Washington
Consolidated Appropriations Act, 2017

“The agreement also directs NSF to establish an Hispanic Serving Institution (HSI) program at no less than $15,000,000...to use this program to build capacity at institutions of higher education that typically do not receive high levels of NSF grant funding.”

American Innovation and Competitiveness Act, P.L. 114-329

“The Director shall award grants on a competitive, merit-reviewed basis to Hispanic-serving institutions (as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a)) to enhance the quality of undergraduate STEM education at such institutions and to increase the retention and graduation rates of students pursuing associate’s or baccalaureate degrees in science, technology, engineering, and mathematics.”

National Science Foundation
HSI Definition

• As specified in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a)
  a) be an eligible institution
  b) have a full-time equivalent enrollment of undergraduates that is at least 25% Hispanic.
Task: Identify critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs of higher education, and potential actionable solutions that fall within NSF's mission, policies, and practices.
NSF HSI Conference

Accelerating the Impact of HSI STEM Education and Research on Innovation Ecosystems

Hosted by the UPRM on November 8-9, 2018 at Mayagüez Resort and Casino

hsiprnsf@uprm.edu

View Schedule
Submit Conference Paper
Register Here
Number of HSIs by State and Location of NSF-sponsored HSI Conferences

HACU Intern: Diana Hernandez

- California State University, Bakersfield
  Master of Public Administration – 2019
- Bachelor’s of Science in Geology – 2017
- HACU National Internship Program – NSF Summer Scholar
- Placed under Education and Human Resources (EHR) – Human Resource Development (HRD) HSI Program
- Mentors: Dr. Andrea Johnson (HRD) and Talitha Washington (DUE)
Hispanic Association of Colleges and Universities

HACU 32nd Annual Conference
Championing Hispanic Higher Education Success: Building America’s Future
Atlanta Marriott Marquis • Atlanta, GA • October 6-8, 2018

J.P. White of OIA, Talitha Washington, Alicia Diaz, HACU’s Executive Director of Legislative Affairs, and Luis Maldonado, HACU’s Chief Advocacy Officer

Dr. Antonio Flores, President & CEO of HACU, and Talitha Washington
Some Recommendations from the Community

- Fine-tune the program as it progresses
- Possible areas to support
  - Faculty development, including culturally-based advising
  - Faculty release time
  - Paid undergraduate research opportunities early and often
  - Bridge programs that align student transitions among high school, two-year and four-year institutions
  - Creation of consortia among HSIs and between HSIs and industry

National Science Foundation
Establishing an HSI Program

• Hispanic-Serving Institution (HSI) Program (NSF 18-524) – March 6, 2018

• Goals for the program:
  ➢ Build capacity at HSIs that typically do not receive high levels of NSF grant funding
  ➢ Increase the retention and graduation rates of students pursuing associate’s or baccalaureate degrees in STEM
  ➢ Focus on undergraduate STEM education

• https://nsf.gov/ehr/HSIProgramPlan.jsp

National Science Foundation
Projects supported by the HSI Program are expected to **generate new knowledge** about how to enhance undergraduate STEM education that results in an increase in retention and graduation rates of undergraduate students pursuing STEM degrees at HSIs.

Proposals should include the **question(s)** to be investigated, explain the **significance** of answering the proposed question(s), and discuss the **evidence or theory** that motivates the question(s).

Each proposal should have clear project **goals**, measurable **objectives**, and **evaluation** activities aligned to the goals and objectives.
Track 1: Building Capacity
- Priority areas: Critical transitions, innovative cross-sector partnerships, and research on broadening participation
- Project length: Up to five years
- Award size: $500,000 to $1,500,000

Track 2: HSIs New to NSF
- Broaden the number of HSIs participating in NSF programs while implementing and adapting any of the priority areas in Track 1.
- Project length: Up to three years
- Award size: Up to $250,000

Resource Hub
- Facilitate networking and professional development that build and strengthen collaborations among HSIs.
- Project length: Up to five years
- Award size: Up to $3,000,000
Awards FY18

Track 1: Building Capacity
- California: 5
- Florida: 2
- New York: 3
- Other states: 0

Track 2: HSI’s New to NSF
- Arizona: 1
- New Mexico: 1
- Other states: 0

Resource Hub
- New Jersey: 2
- Other states: 0
Awards Made in FY18

- Awards were issued to 5 community colleges and 3 universities that have received little to no previous NSF funding

<table>
<thead>
<tr>
<th>Conferences</th>
<th>$690,531</th>
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<td>Track 1: Building Capacity</td>
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<td>Track 2: HSIs New to NSF</td>
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<tr>
<td>Resource Hub</td>
<td>$3,000,000</td>
</tr>
</tbody>
</table>

- The HSI Program also co-funded 2 proposals from HSIs with the NSF INCLUDES and Accelerating Discovery programs
Moving Forward

- Program Officers from DUE, HRD, and DRL work with the HSI Program
- Revising the next solicitation based on community input
- How much $$ will be available?
- Planning for the 2019 PI meeting for the new awardees
- Continue reaching out to institutions that have received little to no NSF funding
- Continually increase the impact of the program
Ongoing Task: Identify critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs of higher education, and potential actionable solutions that fall within NSF's mission, policies, and practices.

Questions?

Dr. Minerva Cordero  
mcordero@nsf.gov

Dr. Talitha Washington  
twashing@nsf.gov

NSF-EHR-HSI@nsf.gov
Tribal Colleges and Universities Program (TCUP)

Jody Chase
Acting Deputy Division Director, Division of Human Resource Development
TCUP...What’s available?

NSF 18-546

- ICE-TI (our signature capacity-building track)
- TSIP (a limited version of ICE-TI)
- TEA Centers (links STEM to local needs)
- SGR (principally research)
- PAGE (promotes success in geosciences)
- PEEC (promotes success in engineering)
- PADLE (promotes success in linguistics)
- SEA-PHAGES in TCUs (with HHMI)
- Pre-TI (to develop a strategic plan)
TCUP Partnerships

NSF 18-546

- Pre-Engineering Education Collaboratives (PEEC: promotes success in engineering)
- Partnerships for Geoscience Education (PAGE: promotes success in geosciences)
- Partnerships for Documentary Linguistics Education (PADLE: promotes success in linguistics)
- TCU Enterprise Advancement Centers (TEA Centers: links STEM to local needs)
Partnerships start with...

“ We need to work together to accomplish something we can’t do separately.”

PEEC developed because leaders in ENG wanted to graduate more Native engineers. They put $1 million on the table. But the TCUP colleges did not offer baccalaureate degrees in engineering.
Partnerships have to ask...

- “What can you do?”
- “What can I do?”

ENG could support faculty, students, and research.

TCUP could support TCUP institutions, but not mainstream universities.
2013 Summer Engineering Experience 1 (SEE 1) students on a huaka‘i (excursion) to the Marine Education Training Center at Honolulu Community College learning about double hull canoe sailing and navigation. Photo credit: Arvin Niro

National Science Foundation
Partnerships have to develop an operational model...

- A management plan details how the partnership will work. The solicitation announces that plan to the field.

TCUP manages the proposals for PEEC and PAGE.

DEL manages the proposals for PADLE.

TCUP supports the TCUP institutions.

ENG, GEO, and DEL support the mainstream institutions.
Partnerships have to be realized in the field...

Collaborations between TCUP and Research Directorate leaders, based on a vision, lead to collaborations between TCUP institutions and mainstream universities.
PAGE tweaked the PEEC model by including graduate work. The result: **Bridging Shared Waters for Geoscience Studies**

- 8 + year study of the phytoplankton dynamics in Bellingham Bay
- Monitoring the propagation and movement of low oxygen waters in Bellingham Bay
- Support tribal fisheries
  - Dungeness crab – 30-60% of income

Marco Hatch¹, Sheridan Nodestine¹, Ciara Asamoto¹, Robin Kodner² ¹NWIC, ²WWU

_National Science Foundation_
Partnerships’ success depends on...

• Mutual respect

• Mutual results

In 2016, Gerald Henry was accepted into graduate school at the University of Arizona. He was NTU’s first Electrical Engineering graduate.
“The impact of this collaboration will be felt all throughout Native homelands as the leaders we are training work on real solutions that are culturally appropriate and scientifically valid.”

-Marcio Hatch, PhD (Samish)
NTU's Electrical and Industrial Engineering programs are ABET-accredited retroactively from October 1, 2015 until September 30, 2024.
“Ericka Begody just accepted a job offer from the Air Force Research Lab in Rome, New York as an Electrical Engineer. She graduates this December. She will be attending Syracuse University to work on her masters and PhD. All paid for by the Air Force.”

- Peter Romine, PhD
TCU Enterprise Advancement Centers

- Allows the TCU to serve as a STEM partner to the tribe or local community, to address infrastructure, environmental, research, or education needs.
- Awards up to $3 million
- Awards up to 5 years, with the potential for renewal
Margaret Mead:

“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.”
Discussion questions

• What can the role NSF INCLUDES be with respect to other NSF and EHR programs that are well established?

• How might convergence research support broadening participation and institutional capacity for:
  ➢ Low income/1st generation, racial/ethnic groups, immigrant status, veterans, people with disabilities, gender
  ➢ And at the intersection of these groups?

• How can broadening participation be meaningfully incorporated in the EHR AC subcommittee themes, such as STEM Education of the Future and Public-Private Partnerships?

• Are there questions or comments about this session that you’d like to discuss with NSF leadership?
Afternoon Break
3:30 – 3:45PM
Prepare to Welcome
Dr. France A. Córdova
Dr. F. Fleming Crim

National Science Foundation
France Córdova, NSF Director
F. Fleming Crim, NSF Chief Operating Officer
EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez
EHR AC Chair
Chancellor
L.A. Community College District
UPDATE

STEM Education Advisory Panel
Nafeesa Owens, Program Officer,
EHR Division of Human Resource Development

Federal STEM 5-year Strategic Plan (2018-2023)
Sylvia James, Acting Deputy Assistant Director, EHR

National Science Foundation
STEM Education Advisory Panel Brief

Nafeesa Owens, Ph.D.

Program Director, NSF
Liaison, Committee on STEM Education (CoSTEM)
Senior Advisor, Federal Coordination in STEM Education Subcommittee (FC-STEM)
Executive Secretary, STEM Education Advisory Panel

National Science Foundation
History/Progress of STEM Education Advisory Panel

• American Innovation and Competitiveness Act (AICA) (Public Law 114-329; Jan 2017)
  • Directed four Federal agencies, NSF, NASA, ED, and NOAA, to form an advisory panel to:
    • advise the National Science and Technology Council (NSTC)’s Committee on STEM Education (CoSTEM),
    • assess CoSTEM’s progress in carrying out its responsibilities, and
    • help identify need or opportunity to update the Federal STEM Education 5-year Strategic Plan.
Introduction/Review of OSTP, NSTC, and CoSTEM

National Science and Technology Council
Chaired by the President
Assistant to the President on S&T presides in place of the President

Committee on STEM Education
Co-Chairs: France Córdova, NSF; Jim Bridenstine, NASA; Michael Kratsios, OSTP

FC-STEM Subcommittee
Co-Chairs: Karen Marrongelle, NSF; Mike Kincaid, NASA; Jeff Weld, OSTP

Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group
History of OSTP and NSTC

• The Office of Science and Technology Policy (OSTP) was officially established by Congressional act, *The National Science and Technology Policy, Organization, and Priorities Act of 1976*.

• The Act also established the Senate-confirmed position of OSTP Director, which has traditionally been a dual role along with Assistant to the President for Science and Technology.

• The National Science and Technology Council (NSTC) is a Cabinet-level council established by Executive Order in 1993 to coordinate science and technology policy across the executive branch.
Executive Order 12881

The National Science and Technology Council (NSTC) was established to perform the following functions:

• To coordinate the science and technology policy-making process;
• To ensure that science and technology policy decisions and programs are consistent with the President’s stated goals;
• To help integrate the President’s science and technology policy agenda across the Federal Government;
• To ensure that science and technology are considered in the development and implementation of Federal policies and programs; and
• To further international cooperation in science and technology.
NSTC Committees

The NSTC is comprised of the following **six committees** that are chaired by agencies and OSTP, with Office of Management and Budget (OMB) representation:

- Committee on Science
- Committee on Technology
- Committee on Homeland and National Security
- Committee on Environment
- Committee on S&T Enterprise
- Committee on STEM Education
Introduction to Committee on STEM Education (CoSTEM)

• CoSTEM originally chartered in 2011 in alignment with the America COMPETES Reauthorization Act of 2010.

• Charged OSTP Director to establish a committee under NSTC.

• CoSTEM responsibilities include:
  • Advise NSTC on Federal priorities and plans, and recommend options for Federal priorities;
  • Review STEM education activities and programs, and the respective assessments of each, through the Federal agencies to ensure effectiveness; and
  • Direct, coordinate, and prioritize the work of its subcommittee(s) including overseeing the development of the Federal STEM Education 5-Year Strategic Plan.
Introduction to Federal Coordination in STEM Education (FC-STEM)

• Subcommittee of CoSTEM

• Responsible for development and implementation of Federal STEM Education 5-Year Strategic Plan
  • Communication of priorities and activities across agencies
  • Development of implementation structure
Members of CoSTEM and/or FC-STEM

- U.S. Department of Agriculture
- U.S. Department of Commerce
- U.S. Department of Defense
- U.S. Department of Education
- U.S. Department of Energy
- U.S. Department of Health and Human Services
- U.S. Department of Homeland Security
- U.S. Department of the Interior
- U.S. Department of Justice
- U.S. Department of Labor
- Office of Science and Technology Policy, Executive Office of the President
- National Aeronautics and Space Administration

National Science Foundation
Smithsonian Institution
CoSTEM, FC-STEM, and Advisory Panel Organization

National Science and Technology Council
Chaired by the President
Assistant to the President on S&T presides in place of the President

Committee on STEM Education
Co-Chairs: France Córdova, NSF; Jim Bridenstine, NASA; Michael Kratsios, OSTP

FC-STEM Subcommittee
Co-Chairs: Karen Marrongelle, NSF; Mike Kincaid, NASA; Jeff Weld, OSTP

Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group
Interagency Working Group

National Science Foundation
In 2017, the panel was formally established as a chartered advisory committee (#2624) in accordance to the Federal Advisory Committee Act (FACA) of 1972 (Public Law 92-463).

A request for nominations was made at the end of 2017.

Thousands of hits to website, hundreds of emails, and over 450 individual names were received from across the country.
Membership Criteria (from AICA)

Members shall:

• primarily be individuals from academic institutions, nonprofit organizations, and industry, including in-school, out-of-school, and informal education practitioners; and
• be individuals who are qualified to provide advice and information on STEM education research, development, training, implementation, interventions, professional development, or workforce needs or concerns.

A primary consideration: recognized knowledge, expertise, or demonstrated ability. Other factors: balance among diverse institutions, regions, and groups underrepresented in science, technology, engineering, and mathematics.
Progress of STEM Education Advisory Panel

- Eighteen (18) members appointed to the panel and jointly announced by NSF, NOAA, ED, and NASA this summer.
Members

- Gabriela A. González, **Panel Chair**
  Deputy Director of the Intel Foundation
  Intel Corporation

- **Vince M. Bertram, Ed.D., MBA**
  President and CEO
  Project Lead The Way

- **Douglas Clements, Ph.D.**
  Kennedy Endowed Chair in Early Childhood Learning, Executive Director of the Marsico Institute for Early Learning and Literacy, and Professor
  University of Denver

- **Lizanne DeStefano, Ph.D.**
  Professor, School of Psychology, Executive Director, CEISMC and Associate Dean, College of Sciences
  Georgia Institute of Technology

*National Science Foundation*
Members

- **Arthur Eisenkraft, Ph.D.**
  Distinguished Professor of Science Education and Director of the Center of Science and Math in Context (COSMIC)
  University of Massachusetts, Boston

- **David L. Evans, Ph.D.; Panel Vice Chair**
  Executive Director
  National Science Teachers Association

- **Jacqueline Huntoon, Ph.D.**
  Provost/Vice President for Academic Affairs
  Michigan Technological University

- **Aimee Kennedy, Ph.D.**
  Senior Vice President for Education, STEM Learning and Philanthropy
  Battelle

*National Science Foundation*
Members

- **Laurie Leshin, Ph.D.**  
  President  
  Worcester Polytechnic Institute

- **Robert D. Mathieu, Ph.D.**  
  Albert E. Whitford Professor of Astronomy and Director of the Wisconsin Center for Education Research  
  University of Wisconsin-Madison

- **Ray Mellado**  
  Chairman of the Board and Founder  
  Great Minds in STEM

- **Ioannis Miaoulis, Ph.D.**  
  President and Director  
  Museum of Science, Boston
Members

• **K. Renae Pullen**  
  K-6 Science Curriculum Instructional Specialist  
  Caddo Parish Public Schools

• **Larry Robinson, Ph.D.**  
  President and Director of NOAA’s Center for Coastal and Marine Ecosystems  
  Florida Agricultural and Mechanical University

• **Kimberly Scott, Ed.D.**  
  Executive Director of the Center for Gender Equity in Science and Technology  
  Arizona State University

• **Robert Semper, Ph.D.**  
  Associate Executive Director  
  Exploratorium

*National Science Foundation*
Members

- **William Yslas Velez, Ph.D.**
  Emeritus Professor of Mathematics
  The University of Arizona

- **Bruce Wellman**
  Chemistry, Engineering, and Robotics Teacher
  Olathe Northwest High School

Full Bios can be found at: [https://nsf.gov/ehr/STEMEdAdvisory.jsp](https://nsf.gov/ehr/STEMEdAdvisory.jsp)
Progress of STEM Education Advisory Panel

• In August, members attended a 2-hour virtual orientation
• In September, a one-day in-person inaugural meeting
  • The meeting was partially closed to the public; members discussed an internal government report that was/is not open for public review or comment.
Additional Guests at Inaugural Meeting

• **France A. Córdova, Ph.D.**  
  Director, NSF  
  Co-Chair, Committee on STEM Education (CoSTEM)

• **Jim Bridenstine**  
  Administrator, NASA  
  Co-Chair, CoSTEM

• **Mike Kincaid**  
  Associate Administrator for Office of STEM Engagement, NASA  
  Co-Chair, Federal Coordination in STEM Education Subcommittee (FC-STEM)

• **Sylvia James, Ed.D.**  
  Acting Deputy Assistant Director, Directorate for Education and Human Resources, NSF;  
  Acting Co-Chair, FC-STEM (until 10/10/18)

_National Science Foundation_
Additional Guests at Inaugural Meeting

• Jeff Weld, Ph.D.
  Senior Policy Advisor and Assistant Director, STEM Education, OSTP
  Co-Chair, FC-STEM

• Chloe Kontos
  Executive Director, National Science and Technology Council (NSTC), OSTP

• William (Jim) Lewis, Ph.D.
  Acting Assistant Director (until 9/30/18), Directorate for Education and Human Resources, NSF

• F. Fleming Crim, Ph.D.
  Chief Operating Officer, NSF
Inaugural Meeting

Open Session - Agenda for the Year
Subcommittee Ideas

• Assessment of Diversity, Inclusion, and Persistence in STEM
• Criteria and Methodology to evaluate effectiveness of federal STEM programs
• “Best” Practices; Public Sharing/Dissemination
Federal STEM Education 5-year Strategic Plan (2018-2023)

Sylvia James
Acting Deputy Assistant Director, EHR
In response to the America COMPETES Reauthorization Act of 2010, the Committee on STEM Education (CoSTEM) chartered the **Federal Coordination in STEM Education (FC-STEM) Task Force** to develop a five-year strategic plan with CoSTEM oversight.
Federal STEM Education 5-Year Strategic Plan 2013-2018:

- included five priority STEM education investment areas that Federal agencies would work together to address (Undergrad, Grad, PreK12, BP, Engagement);
- two coordination objectives (build models & evidence-based approaches)
- a sixth priority area, Computer Science for All, was added in 2016
- Interagency Working Groups (IWGs) were established to coordinate the approaches to each of the priorities
- The final report on the 2013-2018 plan was submitted to OMB and the GAO report on the success of the plan was released in March, 2018.
Federal STEM Education 5-Year Strategic Plan 2013-2018

The production of a Federal STEM Education 5-Year Strategic Plan strategic plan for 2018-2023 is under way, led by Dr. Jeffrey Weld, Senior Policy Advisor, OSTP. It includes input from a wide range of stakeholders, including

- participants at the White House 2018 State-Federal STEM Education Summit
- Federal science agencies as writers, FC-STEM members, and CoSTEM

All information about the plan is embargoed until its official release, expected by the end of 2018.

National Science Foundation
Updates in Briefing Book

• Update on NSF’s Harassment Policy
• EHR Committee of Visitors
• National Academy of Sciences Consensus Study Report ”English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives”
• The NSF 2026 Idea Machine
NSF Response Processes to the National Academies of Science, Engineering, and Medicine Report, “Graduate STEM Education for the 21st Century”

Moderator: Charisse Carney-Nunes
Acting Deputy Division Director, Division of Graduate Education (DGE)
Opportunity for Engagement: 
Graduate STEM Education for the 21st Century

Nimmi Kannankutty
Division of Graduate Education
Division Director (Acting)
October 19, 2018
Opportunity for Engagement: Graduate STEM Education for the 21st Century

Nimmi Kannankutty
Division of Graduate Education
Division Director (Acting)
October 19, 2018
NASEM Report Outcome and Features

Outcomes

• Affirmation that the strength of US STEM graduate education “gold standard”
• Adaptation needed to address emerging needs

Features

• Statement of themes for improving STEM graduate education
• Features of an “ideal” STEM graduate education
• Key recommendations by stakeholder group

The National Academies of Sciences, Engineering and Medicine. 2018
Themes for Improvement of STEM Graduate Education
*common to master’s and doctoral education*

1. Adaptability
2. Core Competencies
3. Diversity, Equity and Inclusiveness
4. Optimize Student Experience
5. Teaching and Mentoring
6. Career Exploration
7. Data Transparency

Institutional change and educational improvement

Improved learning environment

Informed decision-making
An “ideal” STEM graduate education
shift to a student-centered focus

- Technical literacy with deep specialization in area of interest
- Broad scientific context and skillsets to work across areas
- Communication training
- Rich learning experiences: Project-based, team learning
- Career exploration opportunities
- Inclusive, equitable learning environments
- Effective advising/mentoring
- Channels for student voices to inform graduate education
- Data transparency

\[ \pi \text{ – Shaped Training} \]
- NRT
- 2016 APG Grad Ed
- INTERN

\[ \text{Improved learning environment} \]
- NSF INCLUDES

\[ \text{Informed decision-making} \]
- EAC/NCSES
- ECR
1. Support research on the graduate education system, interventions and policies, and outcomes of funding mechanisms

2. Support research on adapting the graduate education enterprise to the changing nature of science

3. Require data collection on graduate students (long-term outcomes); provide this data in proposals for traineeships, fellowships, research assistantships

4. Align policies and award criteria to ensure an “Ideal” graduate education

5. Incentivize diversity, equity and inclusion metrics in funding criteria; include accountability in reporting mechanisms

6. Require Individual Development Plans (IDPs) for graduate students; update annually
Responding to the Recommendations

Input from three groups of stakeholders:

1. Subcommittee of the EHR Advisory Committee
   Dr. Strutchens

2. NSF Program Officer Working Group
   Dr. Easter

3. Division of Graduate Education
Update from an NSF-Wide Program Officer Committee

Earnestine Easter
Program Director, EHR Division of Graduate Education
Update from the EHR Advisory Committee Subcommittee on Graduate Education

Marilyn Strutchens
Emily R. & Gerald S. Leischuck Endowed Professor
Mildred Cheshire Fraley Distinguished Professor, Auburn University and Chair, EHR AC Subcommittee on Graduate Education

National Science Foundation
Response to Recommendations

Graduate STEM Education for the 21st Century
The National Academies, 2018

EHR AC Subcommittee
## AC Graduate Subcommittee Members

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<tr>
<th>Dir/Office</th>
<th>Name</th>
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<tr>
<td>BIO</td>
<td>Carla Caceres</td>
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<td>CISE</td>
<td>Bobby Schnabel</td>
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<td>OIA-CEOSE</td>
<td>Suzanne Barbour</td>
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<td>Julia Parrish</td>
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<td>Caroline Wagner</td>
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<td>EH.R</td>
<td>Jim Spillane</td>
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<tr>
<td>EH.R (Chair)</td>
<td>Marilyn Strutchens</td>
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NSF Support Staff

• William Lewis
• Ernestine Easter
• Nirmala Kannankutty
• Andrea Watkins
Charge

The Subcommittee is charged to review the NASEM Graduate Education for the 21st Century Consensus Study Report, paying particular attention to the recommendations for Federal funding agencies and to offer their advice and recommendations as to how NSF should respond to the report. The subcommittee should deliver its report to the EHR AD and the Chair of the EHR Advisory committee. After review and acceptance by the EHR AC, the report will be presented to the NSF Assistant Directors for their review and possible action.
Updates

• We met for an hour on October 1, 2018
  – Got Acquainted with each other.
  – Brainstormed initial thoughts about the six recommendations.
  – Decided to divide the six recommendations so that we can focus more deeply on each one.
  – We will discuss our responses in more detail on October 24, 2018.
  – We have scheduled another meeting for October 29, 2018 to begin shoring up our ideas and plan for another meeting if necessary to complete the work.
Discussion Questions

• After hearing the background of the report and our subcommittee’s charge what recommendations do you have for us as we move toward addressing our task?
Questions and Comments
Break
10:00 – 10:15AM
EHR Program Highlights

Moderator: Elizabeth VanderPutten
Deputy Division Director, EHR Division of Research on Learning in Formal and Informal Settings
EHR-wide: EHR Core Research

Sarah-Kay McDonald
Senior Advisor, EHR office of the Assistant Director
EHR Core Research (ECR) Program

• Since 2013, EHR has supported fundamental research in science, technology, engineering, and mathematics (STEM) education through the ECR program.

• ECR projects typically align with two genres of research described in the Common Guidelines for Education Research and Development (NSF 13-126): foundational research, and early-stage or exploratory research.

Program goals

- At the program level, ECR emphasizes the accumulation of robust evidence that informs efforts to understand, build theory to explain, & suggest interventions (& innovations) to address persistent challenges in STEM interest, education, learning, and participation.
Recent ECR awards address...

- Neurobiological underpinnings of math and reading disabilities
- Inter-relations among oral vocabulary, reading, mathematics & science difficulties throughout elementary grades
- Associations between perceived supports & persistence for majority and underrepresented minority women in STEM doctoral programs
- Factors that impact interest, participation, retention, & success of women of color in computing & technology fields
- Relationships between motivational beliefs of HS students with learning disabilities, & pursuit of advanced science coursework & careers

*National Science Foundation*
Broad scope of inquiry

- Broadening participation in STEM, STEM learning and learning environments, and STEM professional workforce development

- Proposals may include/involve:
  - all learners, across the life course (e.g., all levels of education)
  - all settings (e.g., formal, informal, technological)
  - methodological innovations, including assessments of learning
  - career pathways & transitions; emerging practices, changing contexts & workforce needs
  - learning, persistence of groups, and underrepresentation in STEM fields
  - theory, techniques, perspectives from wide range of disciplines & contexts
Program goals

• At the program level, ECR emphasizes the accumulation of robust evidence that informs efforts to understand, build theory to explain, & suggest interventions (& innovations) to address persistent challenges in STEM interest, education, learning, and participation.

CONSIDER

• Connections with other EHR programs
• Implications for monitoring, evaluating progress
ECR: WATCH FOR UPDATES

• A new funding opportunity announcement is forthcoming:

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504924

• ECR@nsf.gov

National Science Foundation
CyberCorps® Scholarship For Service (SFS)
Secure and Trustworthy Cyberspace (SaTC) - Education

Victor Piotrowski
CyberCorps SFS Lead
Division of Graduate Education

National Science Foundation
CyberCorps® SFS Scholarships

• Scholarship grants support students earning degrees in cybersecurity in exchange for commitment to work for a federal, state, local, or tribal government agency after graduation.

• First cohort of 9 students entered the Federal workforce in 2002.

• As of January 2018, over 3,300 scholarships have been awarded since 2001 and currently there are 70 participating universities with about 720 students in school.
CyberCorps® SFS Scholarships

- Full tuition, fees plus stipends ($22.5-34K per year) for up to 3 years of study
- Managed by NSF in collaboration with OPM and DHS
- Approximately 26% of graduates go to NSA and 20% to other DoD agencies (Air Force, Army, Navy, DISA, etc.)
- About 62% at the master’s level; 33% undergraduates; 6% served in the Military
- Over 94% success rate

National Science Foundation
CyberCorps® SFS - Building National Capacity

- **Capacity** grants support innovative approaches leading to an increase in the ability of the United States higher education enterprise to produce cybersecurity professionals.

- The **Federal Cybersecurity R&D Strategic Plan** underscores the need for research in cybersecurity education to satisfy the present and future workforce demands for qualified cybersecurity professionals.

- SFS contributes to multi-agency efforts of the **National Initiative for Cybersecurity Education (NICE) program**.
Secure and Trustworthy Cyberspace (SaTC) Education Designation

• Aims to support fundamental scientific advances and technologies to protect cyber-systems from malicious behavior, while preserving privacy and promoting usability

• Proposal designations:
  – Core
  – Education (EDU)
  – Transition to Practice (TTP)

• Cross-Directorate and Industry Partner Solicitation: NSF CISE, EHR, ENG, MPS, and SBE with Semiconductor Research Corporation
One Hundred Fifteenth Congress
of the
United States of America

AT THE FIRST SESSION

Began and held at the City of Washington on Tuesday,
the third day of January, two thousand and seventeen

An Act

To authorize appropriations for fiscal year 2018 for military activities of the Department of Defense, for military construction, and for defense activities of the Department of Energy; to prescribe military personnel strengths for such fiscal year, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “National Defense Authorization Act for Fiscal Year 2018”.

National Science Foundation
Pilot Program.--Not later than 1 year after the date of enactment of this subtitle, as part of the Federal Cyber Scholarship-for-Service program established under section 302 of the Cybersecurity Enhancement Act of 2014 (15 U.S.C. 7442), the Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall develop and implement a pilot program at not more than 10, but at least 5, community colleges to provide scholarships to eligible students who—

(1) are pursuing associate degrees or specialized program certifications in the field of cybersecurity; and

(2)(A) have bachelor's degrees; or (B) are veterans of the Armed Forces.
(…) provide awards to improve cybersecurity education at the kindergarten through grade 12 level—

(A) to increase interest in cybersecurity careers;
(B) to help students practice correct and safe online behavior and understand the foundational principles of cybersecurity;
(C) to improve teaching methods for delivering cybersecurity content for kindergarten through grade 12 computer science curricula; and
(D) to promote teacher recruitment in the field of cybersecurity.
Summer 2018

- 150 GenCyber camps in 43 states, DC and PR
- 82 hosting institutions
- 4,123 students and 1,156 teachers participated
- female students - 48%; teachers - 68%
- ethnic/racial diversity of students – 44%; teachers – 32%
A Snapshot of the Robert Noyce Teacher Scholarship Program

Sandra Richardson, Noyce Program Lead
Division of Undergraduate Education
Track 1: S&S
Scholarships & Stipends for Undergraduate STEM majors and professionals

Track 2: TF
NSF Teaching Fellowships for STEM professionals

Robert Noyce Teacher Scholarship Program

Track 3: MTF
Master Teaching Fellowships for Exemplary, experienced STEM teachers

Track 4: Noyce Research
for Research related to STEM teacher effectiveness, persistence, and retention in high-need districts

*Capacity Building projects, which may lead to the development of full proposals for Tracks 1, 2, or 3, are also supported.

National Science Foundation
Primary program goal is to encourage talented STEM majors and professionals to become K-12 STEM teachers in high-need districts.

Collaborative efforts between STEM and education faculty and high-need school districts.

Projects must provide evidence of exemplary teacher preparation, development, and retention efforts.
Broadening Participation Efforts in Noyce

The Noyce program –

• Focuses on developing, retaining, and diversifying the STEM teacher workforce;

• Develops K – 12 teacher leaders (from diverse backgrounds) in high-need school districts;

• Funds Capacity Building projects;

• Promotes capacity-building strategies for MSIs through funded technical assistance workshops (Award 1742877 to Quality Education for Minorities Network);

• Supports working groups to identify a research agenda for K-12 STEM teacher preparation for high-need school districts (Award 1548986 to AAAS).
Goal

This project, organized by the American Association for the Advancement of Science (AAAS) Education and Human Resources Programs, seeks to provide resources, tools, and a community to foster research and evidence-based innovation in STEM preservice teacher education and leadership development programs for high-need schools.

Upcoming Noyce/AAAS Webinars

Supporting ALL Learners Using Active Learning Pedagogy
October 25 at 3:30pm EDT
Dr. Jose Blackorby, Director of Research and Development at Center for Applied Special Technology
Dr. Jiwon Hwang, Assistant Professor of Special Education at California State University, Bakersfield

Culturally Relevant Pedagogy in the Preparation of Teachers to Work in High-Need Districts
Last week of November
Dr. Etta Hollins, Kauffman Endowed Chair for Urban Teacher Education at University of Missouri-Kansas City
Broadening Participation Efforts in Noyce

Noyce Partnerships Are Critical

- High-need School Districts
- Non-profit Organizations
- STEM University Depts
- Industry/Labs
- Regional Centers
- 2-Year Colleges
- Education University Depts
- Professional Societies
- Research Institutes/Agencies

National Science Foundation
Active Awards Example
(Aligning with NSF BP Efforts)

Recruiting and Preparing a New Generation of Mathematics, Science, and Computer Science Teachers for High Need Schools
(Award 1758507 – associated awards 1439914 and 1035483; PI: Ann Cavallo; University of Texas at Arlington)

- Track 1 Scholarships & Stipends project
- Partnerships with Tarrant County Community College and Dallas, Arlington, and Ft. Worth ISDs.
- Supports 50 scholars
- Includes ongoing research component that measures Noyce scholars' learning and transition into teaching, including shifts in self-efficacy toward teaching, primary teaching practices, and views of the nature of mathematics and science disciplines
- Potential to lead to a national model for success in STEM teaching in urban settings that will stimulate broadening participation in STEM and promote social justice through mathematics and science teaching and learning

National Science Foundation
A Study on Promoting Reflective and Equitable Practice Through Science Teacher Induction (Award 1540789; PI: Gillian Roehrig; University of Minnesota-Twin Cities)

- Track 4 Noyce Research project
- Extending existing theories on preparing culturally responsive science teachers and reflective practitioners
- Creating a scientist-teacher partnership induction program in which mutual learning is emphasized between undergraduate Learning Assistants and beginning secondary science teachers
- Studying induction programs as well as construct a set of empirically-based design principles for scientist-teacher partnership induction programs
Louis Stokes Alliances for Minority Participation: Aiming High and Making a Difference

EHR Advisory Committee Meeting
National Science Foundation
Alexandria, VA

Dr. LeRoy Jones, II
EHR/HRD/LSAMP
19 October 2018
Louis Stokes Alliances for Minority Participation

- Authorized by Congress in 1991
- Significantly increase the quality and quantity of underrepresented minority (URM) students successfully completing STEM BS degree programs to diversify workforce
- Implement strategies that focus on critical transition points
- Alliances are composed of universities and colleges, government labs, industry and not for profit partners

Targeted Groups & Disciplines

✓ Blacks
✓ Hispanics
✓ American Indians
✓ Alaska Natives
✓ Pacific Islanders

✓ Agricultural Sciences
✓ Chemistry
✓ Computer Science
✓ Engineering
✓ Environmental Science
✓ Geosciences
✓ Life/Biological Sciences
✓ Mathematics
✓ Physics/Astronomy
LSAMP Model

The Tinto Model of Student Retention

Institutions of Higher Education

- **ACADEMIC INTEGRATION**
- **SOCIAL INTEGRATION**
- **PROFESSIONALIZATION**

✓ **ACADEMIC** – Academic performance and faculty/staff interactions
✓ **SOCIAL** – Extracurricular activities and peer group interactions
✓ **PROFESSIONALIZATION** – Skills, culture and attitudes of STEM discipline

Sources: Adapted from Revitalizing the Nation’s Talent Pool in STEM, Washington DC
The Urban Institute, 2006

National Science Foundation
EHR

DIRECTORATE FOR
EDUCATION & HUMAN RESOURCES

NST

✓ ACADEMIC – Academic performance and faculty/staff interactions
✓ SOCIAL – Extracurricular activities and peer group interactions
✓ PROFESSIONALIZATION – Skills, culture and attitudes of STEM discipline

National Science Foundation
Evolution of the LSAMP Model and Funding Opportunities

Louis Stokes Regional Centers of Excellence in Broadening Participation
*Est. ~2012*

Louis Stokes Alliances for Minority Participation

The Tinto Model of Student Retention

Bridge to the Baccalaureate
*Est. ~2008*

Bridge to the Doctorate
*Est. ~2003*

LSAMP Model
*Est. 1991*

Academic and Social Integration

Student Retention and Graduation

Entry into Graduate School or STEM Workforce

Socialization into Science

Additional Research Opportunities
Domestic and international
*Est. ~2000*

Source: What Works! The LSAMP Research Model
Mathematica Policy Research, 2016

National Science Foundation
STEM Enrollment and Bachelor’s Degrees Awarded to LSAMP Underrepresented Minority Students

Source: WebAMP ExACT Reports
ICF, 2018
55 Active Alliances
7 alumni Alliances
>600 LSAMP Institutions

National Science Foundation
LSAMP – A Program Modeling Group Impact

Booklet Features

✓ LSAMP History and Articles
✓ Department of Energy Partnership
✓ International Research Opportunities
✓ Broadening Participation Awards
✓ Individual Alliance Impact Highlights
✓ Pilot Broadening Participation Center
✓ LSAMP Impact Report Viewer Application

National Science Foundation

NSF HRD Award No. 17-47988
THANK YOU!!!

LSAMP Team

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*National Science Foundation*
Innovative Technology Experiences for Students and Teachers (ITEST)

Program Overview by David Haury
Aims of the ITEST program

Ensure a high-quality STEM workforce by supporting projects that:

✓ Increase student awareness of career opportunities in STEM fields.

✓ Motivate students to pursue appropriate educational pathways to STEM-related careers.

✓ Provide technology-rich experiences that develop disciplinary knowledge, practices, and non-cognitive skills needed in STEM fields.
Distinguishing Features of ITEST

✓ A Broadening Participation Emphasis Program [Solicitation-Specific Review Criteria].
✓ The Program is supported through revenues generated by applications for H-1B visas.
✓ Funded projects must engage PreK-12 youth in formal or informal education settings.
✓ The program promotes engagement with emerging technologies that will likely be encountered in STEM workplaces of the future.
Three Types of Projects are Supported

**Exploratory** projects with funding up to $400K for projects lasting up to 2 years.

**Strategies** projects with funding up to $1.2M for projects lasting up to 3 years.

**SPReaD** (Successful Project Expansion and Dissemination) projects with funding up to $2M for projects lasting 3-5 years.
Solicitation Specific Review Criteria

✓ Explicit strategies for recruiting and selecting participants from one or more underrepresented populations.

✓ Identify the specific needs of the group(s) being served and include specific plans or strategies for addressing them.

✓ Planned technology experiences and learning activities are developmentally and age appropriate.
Priority Areas for Research

1. Student experiences with emerging technologies.
2. Motivation and preparedness to pursue STEM careers.
3. Instructional and curricular innovations.
4. Partnerships with business and industry.
5. Partnerships with communities.
6. Partnerships with school policy leaders.
7. Partnerships with career technical education.
Attracting and preparing students for the STEM workforce is interpreted broadly as preparing students for STEM careers at all levels, from technicians at middle skills levels to researchers needing advanced academic degrees in STEM fields.
Example 1: Understanding the Influence of a Teachable Robot on STEM Skills and Attitudes

Award: 1637809, Mount Holyoke College

Middle school geometry students learn new concepts by tutoring a humanoid robot to manipulate its gestures and spoken prompts in response to student utterances and problem-solving actions. The project is examining how the act of tutoring can lead to motivational benefits such as student engagement, positive attitudes toward the subject being studied, and increased confidence.
Example 2: SportsLab:2020 - Bringing Sport Research and Design Challenges into the 21st Century

Award: 1311901, TERC, Inc.

This project, in partnership with Nike and Vernier Software, is developing and testing a collaborative game-based interactive environment where students, ages 12-18, work with sport researchers in product design teams to create concept models for a sport product design challenge. The project is examining the potential use of design challenges to enhance STEM learning.
Example 3: Broadening Interest in Geosciences, Habitat, and Technology among Girls

**Award:** 1513328, University of Alaska Fairbanks

This project examines an out-of-school, place-based, and research-based learning environment on the STEM career interests and identity development of high school girls. In Juneau the program focuses on the life histories and ecosystems of harbor seals, and in Fairbanks the focus is on the life histories and ecosystems of harbor salmon, animals familiar and important to the cultural lives of participants.
Lunch 11:30 – 12:00PM

Please proceed to the cafeteria around the corner to purchase lunch and return for group discussion.
EHR Subcommittee Update: STEM Education of the Future

Margret Honey
President & CEO, New York Hall of Science
Chair, EHR AC Subcommittee, Future of STEM Education
Reflections from the EHR AD

Karen Marrongelle
Assistant Director, EHR
EHR AC Discussion

Facilitator: Julie Johnson
Program Director, Division of Research on Learning in Formal and Informal Settings
Discussion questions

• Over the last two days, what has surprised you? What would you like to learn more about?
EHR ADVISORY COMMITTEE MEETING
October 18 - 19, 2018

Francisco Rodriguez
EHR AC Chair
Chancellor
L.A. Community College District