

# NSF

Special Report to the Nation II

# INCLUDES



## Building Connections

SHARED VISION

PARTNERSHIPS

GOALS AND METRICS

LEADERSHIP AND COMMUNICATION

EXPANSION, SUSTAINABILITY, AND SCALE

July 2020

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NSF INCLUDES National Network Convening, May 2019  
Photo Credits: NSF INCLUDES Coordination Hub

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# WHO WE ARE

**NSF INCLUDES** (Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science) is a comprehensive national initiative designed to enhance U.S. leadership in discoveries and innovations by focusing on diversity, inclusion and broadening participation in Science, Technology, Engineering and Mathematics (STEM) at scale.



## A MESSAGE FROM THE DIRECTOR

I am pleased to share with you this second NSF INCLUDES Report to the Nation which highlights the progress of our collective efforts to achieve more diversity in STEM. This report showcases the important work of NSF INCLUDES grantees; the lessons learned on building connections; and the corporate and federal partnerships that are empowering the national movement to broaden participation in STEM. What is uniquely bold about NSF INCLUDES is the focus on developing intentional collaboration and networks that are committed to common agendas and systemic approaches to solving specific STEM-inclusion challenges at a national scale.

NSF INCLUDES completed its fourth year of activities in 2019. Building on the success of the initial multi-organizational Launch Pilots funded in 2016 and 2017, the initiative awarded the first large-scale NSF INCLUDES Alliances in 2018 and 2019. These Alliances are building the comprehensive collaborative infrastructure needed to accelerate innovative solutions to large broadening participation challenges. Applying the five design elements of collaborative infrastructure 1) shared vision, 2) partnerships, 3) goals and metrics, 4) leadership and communication, and 5) expansion, sustainability, and scale, the eight Alliances are engaging more organizations and people, employing new methods, and gathering data on shared metrics.

In another major milestone in 2018, NSF INCLUDES established a Coordination Hub as a support organization for the entire NSF INCLUDES National Network. By providing technical and communication infrastructure and convening stakeholders, the Coordination Hub fosters the growth, expansion, and visibility of the National Network. The Coordination Hub's online portal is connecting all the NSF INCLUDES National Network partners, facilitating new opportunities to work collaboratively and laying the foundation for even more progress in future years.

The NSF INCLUDES National Network has further expanded beyond these core NSF INCLUDES components by leveraging allied efforts of other NSF investments (e.g., broadening participation, science of broadening participation research, large scale networks, and other scientific research investments) and those of other funding organizations (e.g., Department of Defense, Department of Education, National Aeronautics and Space Administration, National Institutes of Health, National Oceanic and Atmospheric Administration, U.S. Geological Survey, U.S. Patent and Trademark Office, and non-federal STEM funders) that support the goals of NSF INCLUDES. To connect other knowledge and practice domains to the NSF INCLUDES National Network, new grants have provided resources to coordinate and conduct new research; to disseminate new and existing research and practice; to create new opportunities that expand workforce technical capabilities; and to adopt the NSF INCLUDES goals and principles of collaborative infrastructure and networks in new and existing broadening participation efforts.

I am grateful to NSF's former director, France Córdova, for her leadership that led to the development of NSF INCLUDES as part of NSF's 10 Big Ideas. With release of this report, I extend NSF's appreciation to our investigators and stakeholders whose tremendous effort drives the progress of the NSF INCLUDES National Network and our Nation. I encourage you to join the NSF INCLUDES National Network!

Sethuraman Panchanathan

A handwritten signature in blue ink that reads "Sancha" in a stylized, cursive script.

Director, National Science Foundation

## NSF INCLUDES VISION

The vision of NSF INCLUDES is to catalyze the STEM enterprise to work collaboratively for inclusive change, resulting in a STEM workforce that reflects the population of the Nation.

# NSF INCLUDES PRIORITIES

THE **TWO** PRIMARY TENETS OF NSF INCLUDES ARE:

1

## Broadening Participation in STEM

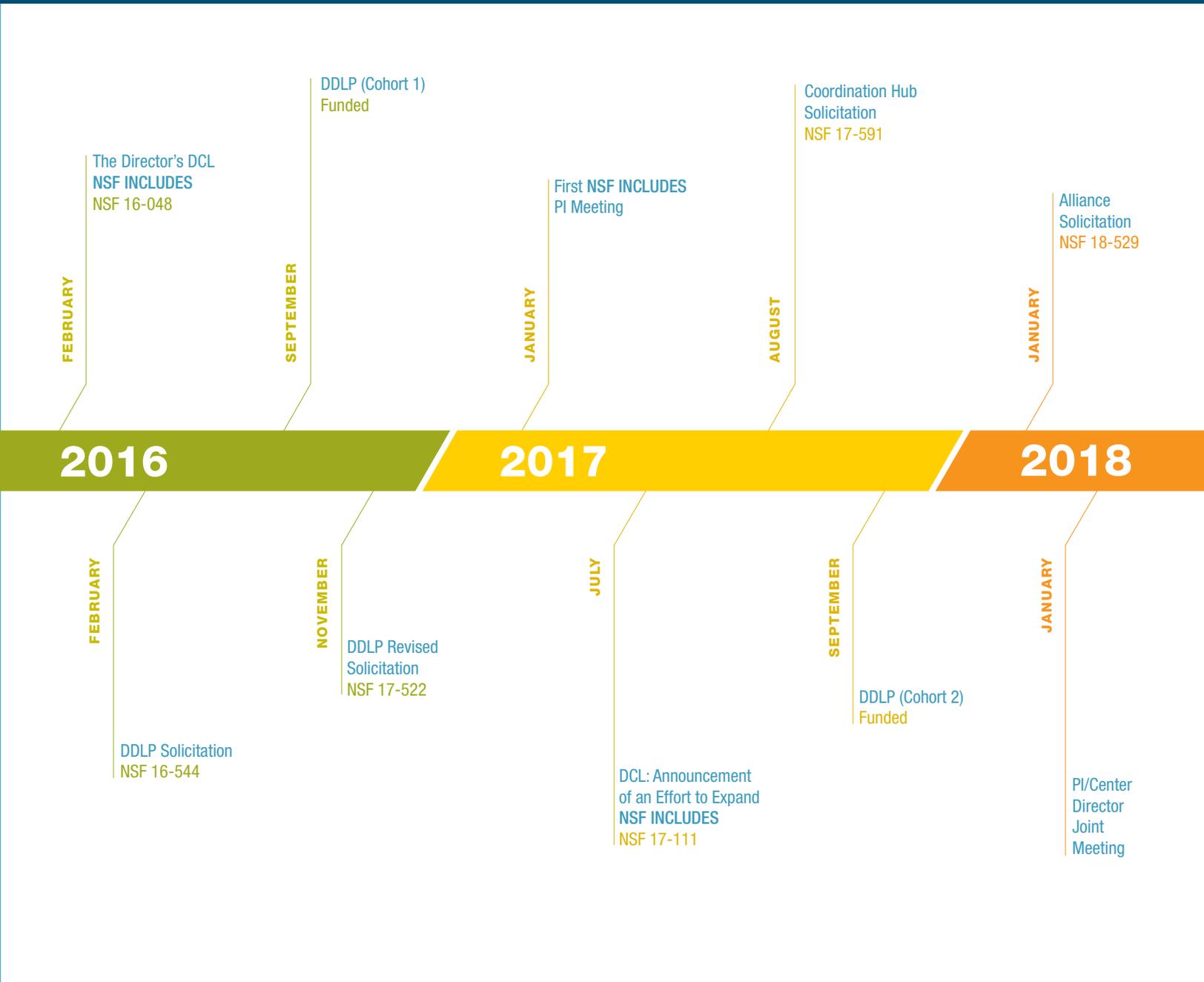
NSF INCLUDES is especially interested in broadening participation for those groups historically underrepresented in STEM fields such as African Americans, Hispanics, Native Alaskans, Native Americans, Native Hawaiians, Pacific Islanders, persons with disabilities, women and girls, and persons from economically disadvantaged backgrounds.

2

## Collaborative Infrastructure

The hallmark of NSF INCLUDES is collaborative infrastructure. Collaborative infrastructure is the process by which organizations and institutions come together with a shared vision; map out mutually reinforcing activities; develop goals, objectives and measures to assess their progress; engage in continuous communication; and advance the potential for expansion, sustainability, and scaling that would not be possible otherwise. NSF INCLUDES is embodied through the NSF INCLUDES Five Design Elements of Collaborative Infrastructure. Each NSF INCLUDES project utilizes the five elements as a framework for accelerating change in addressing their broadening participation challenge.

# NSF INCLUDES NATIONAL NETWORK TIMELINE



In their first year of implementation, Design and Development Launch Pilots (DDL) engaged more than 20,000 participants.

The May 2019 National Network Convening was the first time the entire NSF INCLUDES Network convened.



The January 2018 NSF INCLUDES Center Summit, “NSF INCLUDES Summit: Broadening Participation through Center-Scale Research Activities”, brought together NSF Grantees from centers and center-scale projects to share information about broadening participation activities, strategies and outcomes, and to identify ways to use collaborative change strategies to further their initiatives.

## NSF INCLUDES FIVE DESIGN ELEMENTS OF COLLABORATIVE INFRASTRUCTURE

The NSF INCLUDES National Network Infrastructure is designed to foster collaboration by emphasizing five design elements of collaborative infrastructure: Shared Vision, Partnerships, Goals and Metrics, Leadership and Communication, and Expansion, Sustainability, and Scale.



### Engage the community in a shared vision

Every NSF INCLUDES project and the NSF INCLUDES National Network engages a broad community in a shared vision of the importance and power of diversity for scientific innovation.



### Provide a platform for collaborative action

Partnerships and networks are at the heart of the NSF INCLUDES National Network. The Coordination Hub, Alliances, Design and Development Launch Pilots, conferences and other NSF INCLUDES funded projects provide a platform for partnerships and collaborative action.



### Allow for evidence-based decision making

Partnerships and networks run on shared goals and metrics that allow for robust data that facilitate evidence-based decision making.



### Increase communication and visibility

NSF INCLUDES is designed to build capacity for leadership and communication among organizations and individuals to create opportunities in STEM education and careers.



### Establish the capacity for expansion, sustainability, and scale

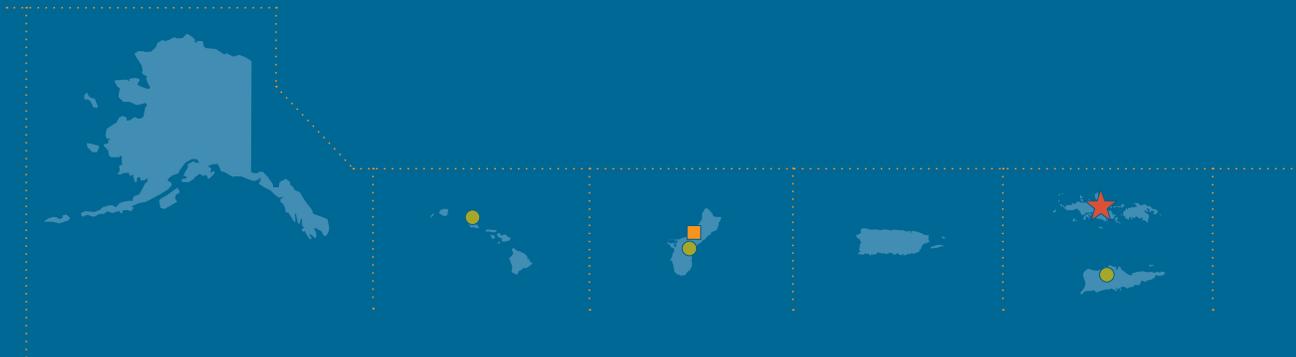
Collaborative infrastructure should lead to more partners joining the movement, more connections being made, and a chance for collaborative change to lead to expansion, sustainability, and scale.

# Building Connections

The NSF INCLUDES National Network is building connections across the Nation. The map shows the current NSF INCLUDES Network. The lead institutions of the Design and Development Launch Pilots are marked in green circles. The lead institutions for alliances are represented by the red stars. NSF INCLUDES funded activities, such as conferences, EAGERs, supplements and other NSF INCLUDES Connectors are represented by orange squares. The Coordination Hub serves as a connector between all of the components of our network.

# NSF INCLUDES

# NATIONAL NETWORK MAP



- DDLP (Lead Institution)
- Conferences, EAGERs, Supplements and other NSF INCLUDES connectors
- ★ Alliances (Lead Institution)
- ⬠ Coordination Hub (Lead Institution)

# Building Connections



**Scratch Maker Camp facilitated by ACCEYSS Network member, Dr. Sean Justice.**

Photo Credit: ACCEYSS (Association of Collaborative Communities Equipping Youth for STEM Success) (NSF 1764404)



**Lego robotic champion team at First2 Network Summer Immersion Research.**

Photo Credit: First2 Network



**First2Network Research Students and Faculty at Marshall University.**

Photo Credit: First2Network. (NSF 1834601, 1834569, 1834586, 1834575, 1834595)

## How NSF INCLUDES Grantees are Building Connections

NSF INCLUDES is transforming and building a more diverse STEM enterprise through building connections, collaborations, partnerships, and relationships.

**Websites and electronic platforms** are used as a resource to elevate visibility, connect with learning communities, share resources, and host online capacity-building events.

**Convenings, conferences, workshops, and institutes** are utilized to share knowledge and learn from other Network members.

**Working in collaboration with professional societies, industry, school districts, and community organizations**, NSF INCLUDES projects raise awareness and reach target audiences.

**Research exchange programs and internships** are frequent mechanisms NSF INCLUDES projects engage in to prepare students for the STEM workforce.

**Connections to other programs within NSF** have been critical in leveraging the efforts and impact of NSF INCLUDES projects. These programs include, Improving Undergraduate STEM Education: Hispanic-Serving Institutions (IUSE: HSI), Alliances for Graduate Education and the Professoriate (AGEP), Louis Stokes Alliances for Minority Participation (LSAMP), STEM plus Computing (STEM+C), Innovative Technology Experiences for Students and Teachers (ITEST), and Established Program to Stimulate Competitive Research (EPSCoR).

**Finally, NSF INCLUDES is engaging with other federal agencies, industry, private foundations, and funders** through activities such as the Federal STEM Education 5-Year Strategic Plan: Charting a Course for Success: America's Strategy for STEM Education. As a part of the implementation, several federal agencies committed to joining the NSF INCLUDES National Network.

# Building Connections

A NATIONAL NETWORK

## 2016-2017 Design and Development Launch Pilots

Building the NSF INCLUDES National Network began in FY 2016 (NSF 16-544) and continued in FY 2017 (NSF 17-522) with the funding of 70 Design and Development Launch Pilots. These two-year projects explored the feasibility of using collaborative change strategies in bold, innovative ways on a limited scale to solve broadening participation challenges in STEM.

NSF INCLUDES Design and Development Launch Pilots have an expansive reach, engaging more than 35,000 individual participants and more than 1,100 partner institutions in 49 states.

Short-term outcomes include improving participants' attitudes toward STEM and achieving high levels of participant and partner commitment to and satisfaction with the project.

Launch pilots most commonly made progress on short-term broadening participation (BP) outcomes.

## 1,199 PARTNERS

Academic **33%**  
Community Organizations **25%**  
Business and Industry **11%**  
Government **12%**  
Schools and School Districts **10%**  
Professional or Research Organizations **7%**  
Other **2%**

## 35,501 PARTICIPANTS

Students  
Parents  
Teachers  
Faculty  
Stakeholders  
Community

89%

**33 OF 37 LAUNCH PILOTS REPORTED PROGRESS TOWARD PARTICIPANT STEM ATTITUDES.**

Including increased interest in pursuing a bachelor's degree in a STEM field; increased sense of belonging in computer science; higher levels of self-efficacy in STEM

100%

**33 OF 33 LAUNCH PILOTS REPORTED PROGRESS TOWARD PARTICIPANT COMMITMENT AND SATISFACTION IN STEM.**

Including high levels of satisfaction in intervention activities; interest in continuing the intervention; increased understanding of STEM industries

80%

**24 OF 30 LAUNCH PILOTS REPORTED PROGRESS TOWARD PARTNER BP SKILLS OR KNOWLEDGE.**

Including adopting inclusive practices for graduate admissions; developing new STEM courses; increased understanding of BP strategies

100%

**24 OF 24 LAUNCH PILOTS REPORTED PROGRESS TOWARD PARTNER COMMITMENT AND SATISFACTION WITH BP.**

Including satisfaction in participation; increased resolve to address BP in their institution; plans for collaboration with fellow launch pilot partners

64%

**18 OF 28 LAUNCH PILOTS REPORTED PROGRESS TOWARD STEM COURSEWORK OR DEGREE ATTAINMENT.**

Including increased enrollment in STEM classes; increased experience in STEM field work; progress toward STEM PhD programs

**These data represent progress made by launch pilot subsets that specified a focus on the short term BP outcomes above.**

# Building Connections

A NATIONAL NETWORK

## 2017 - Present

### NSF INCLUDES Connectors

Starting in FY 2017, NSF funded NSF INCLUDES Connectors. These activities represent opportunities for novel methods in which new and currently-funded NSF projects from across all NSF directorates engage with the NSF INCLUDES National Network. Proposals for NSF Connectors are submitted through NSF INCLUDES Dear Colleague Letters (NSF 17-111, NSF 19-038, and NSF 19-042) and include Early-concept Grants for Exploratory Research (EAGER), conferences and workshops, co-funding and supplements.

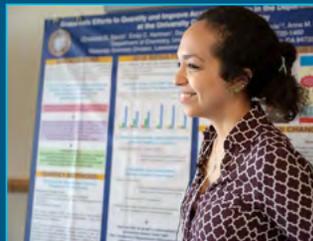


Photo Credit: NSF INCLUDES Symposium for ADVANCING Latinas in STEM Academic Careers



Brochures from NSF INCLUDES co-funded Louis Stokes Alliances for Minority Participation Regional Centers for Excellence in Broadening Participation

# PROJECT HIGHLIGHTS

## LSAMP/NSF INCLUDES

Florida-Caribbean Louis Stokes Regional Center for Excellence (FL-C LSRCE, NSF 1826532) is one of the six Louis Stokes Regional Centers for Excellence in Broadening Participation supported by NSF INCLUDES. In July 2019, FL-C LSRCE launched its first annual "Mindsets for STEM Institute" which convened more than 70 STEM faculty from participating institutions and local K-12 science and math administrators and teachers.

## Supporting MSI Faculty

The Quality Education for Minorities (QEM) Network advanced its work with faculty at Minority-Serving Institutions (MSIs) with an NSF INCLUDES grant. QEM Network's proposal development workshops build awareness and capacity for MSI faculty to compete for federal grant funds. In 2019, QEM trained more than 350 MSI faculty to apply for grants from NSF and NASA. As part of the Coordination Hub team, QEM supports the entire National Network.

## Engineering Education

In May 2019, the ERC-INCLUDES Capacity-Building Institute (NSF 1836511) convened representatives from NSF Engineering Research Centers (ERCs) and NSF INCLUDES projects to share strategies related to student retention, educator inclusiveness, and scaling inclusion practices, as well as to explore collaborations for future proposals and publications. This event connected researchers funded by the Education and Human Resources (EHR) and Engineering (ENG) directorates under multiple programs by leveraging the ERCs.

## Supporting Latinas in STEM

The NSF INCLUDES Symposium for ADVANCING Latinas in STEM Academic Careers (NSF 1813017) supports gender and ethnic diversity in STEM faculty to provide a broader range of role models, help prepare students to participate in an increasingly diverse workforce, weaken stereotypes, and improve the range of perspectives informing academic learning, as well as higher education policy.



STEM SEAS cohort on R/V Sikuliaq.  
Photo Credit: GP-IMPACT: Science, Technology, Engineering and Math Student Experiences Aboard Ships (STEMSEAS) (NSF 1934729)

Network  
Engagement  
& Capacity  
Building

Network  
Expansion &  
Growth

Communications

Shared  
Measurement

Research

**NSF INCLUDES**

# The Coordination Hub

[www.INCLUDESNetwork.org](http://www.INCLUDESNetwork.org)

**SRI International**



Digital Promise



To continue building the National Network, in FY 2018 NSF funded the NSF INCLUDES Coordination Hub (NSF 1818635) through solicitation NSF 17-591. The Coordination Hub facilitates the activities needed to build and maintain a strong NSF INCLUDES National Network, including communications, capacity building, and efforts aimed at increasing visibility. The Hub coordinates the interoperability and alignment of activities within the Network. The Hub is also helping to foster the overarching vision and strategy.

The Coordination Hub is critical to building connections for the NSF INCLUDES National Network. Through the Hub, NSF INCLUDES is able to accelerate progress toward diversifying the U.S. STEM workforce. The Hub is a collaboration of multiple institutions, led by SRI International. Collectively, the Hub Team works to develop and strengthen the NSF INCLUDES National Network, support Network members' use of data to inform strategic decision making, communicate discoveries, successes, and lessons learned, and advance the expansion, sustainability, and scale of strategies that broaden participation in STEM.



# Building Connections

## Shared Measures

NSF INCLUDES projects have well-defined, relevant goals and measurable objectives and outcomes including progress indicators. The Coordination Hub, in collaboration with National Network grantees, is developing shared measures across the National Network to support strategic decision making and build measures to track progress towards collaborative infrastructure for broadening participation in STEM.

### The Coordination Hub facilitated activities in support of shared measurement

- Documented the range of metrics proposed by Cohort 1 Alliances
- Reviewed literature on shared measurement in collective impact
- Presented on shared measures at the 2019 National Network Convening
- Engaged NSF in conversations about a shared measures plan
- Developed a framework for goals and objectives
- Created the Shared Measures Affinity Group and resource guide for reporting results

# Affinity Groups

The Coordination Hub supports 10 Affinity Groups with more than 500 total members; four of these groups are peer-led. The Evaluation Affinity Group is the largest, with 160 members.

GROUP MEMBERSHIPS & ACTIVITIES	MEMBERS
Disability and Accessibility in STEM	53
Evaluation Affinity Group	160
Exploring STEM Pathways, K-12 to Career	51
Indigenous STEM	34
Models of Collaborations and Partnerships	119
Shared Measures	40

Examples of six Coordination Hub Affinity Group memberships and activities

The Coordination Hub is developing rich engagement campaigns to support Network growth.

The @NSFINCLUDES Hub Twitter campaign for National STEM/STEAM Day resulted in a 135% increase in Tweet Impressions, 45 new followers, and 328 unique links to INCLUDESNetwork.org.

Twitter campaigns, one of the Coordination Hub's strategies for raising public awareness of the National Network and its resources, often spotlight new website content—featuring NSF INCLUDES efforts as well as other Network members' endeavors.

The National Network has already grown to more than 1200 members, nearly half of whom participate in the online community.

# Building Connections

A NATIONAL NETWORK

2018 – 2019

## ALLIANCES

In Fiscal Years 2018 and 2019, NSF funded two cohorts of NSF INCLUDES Alliances through solicitation NSF 18-529, which built upon the achievements of the Design and Development Launch Pilots and have the potential to substantially broaden participation in STEM fields. Alliances take collaborative change strategies, lessons learned, promising practices, and evidence-based mechanisms from the Design and Development Launch Pilots; the science of broadening participation literature; and the research and evaluations from past and present efforts related to broadening participation in STEM and employ them at scale.



## Cohort 1 Alliances

reported engaging more than **2,500 individual participants** and nearly **200 partner institutions** in their first year of implementation.

191  
PARTNERS

Academic institutions 36%  
Professional or research organizations 19%  
Government 18%  
Community organizations 15%  
Business and industry 8%  
Schools or school districts 3%  
Other alliances 1%

2,501  
PARTICIPANTS

Students  
Parents  
Teachers  
Faculty  
Stakeholders  
Community

Alliances bring together programs, people, organizations, technologies, and institutions to achieve results at scale, provide new research, and leverage NSF's broadening participation investments. Each Alliance is committed to collectively achieving common goals through a well-defined set of common objectives. The NSF INCLUDES approach requires that each Alliance focus on its own vision and goals, and work with other organizations within the NSF INCLUDES National Network. This work is facilitated through the NSF INCLUDES Coordination Hub. Alliances are also supported by their own independent backbone or support organization.



STEM-OPS | STEM PUSH | SEAS ISLANDS

# Building Connections

NSF INCLUDES Alliances have the opportunity to measure long-term broadening participation outcomes such as the level of STEM coursework or degree attainment and participation in the STEM workforce through longitudinal administrative data (e.g. student enrollment and achievement data). The list below represents some of the long-term broadening participation outcomes the alliances plan to measure.

## Long-term Broadening Participation Outcomes:



Participant STEM attitudes



Participant STEM knowledge or skills



Partner satisfaction or level of commitment



Participant participation in STEM workforce



Participant satisfaction or level of commitment



Participant level of STEM coursework or degree attainment



Partner knowledge or skills to improve broadening participation

# Lessons Learned on Building Connections

## START WITH A CLEAR STRATEGY

A clear strategy or framework for building partnerships provides a solid foundation for implementing the shared vision of the Alliance.

## BUILD CONNECTIONS THROUGH SHARED GOALS

Connecting partners with similar goals can strengthen the Alliances' work.

## ALIGN

Make certain that the role of each community partner is understood and valued throughout the network.

## CONTEXT MATTERS

Understand national trends regarding the broadening participation challenge as well as the local context of successes and challenges.

## INVOLVE STUDENTS AS LEADERS

Supporting student-leadership within Alliance work will help develop the next generation of informed and equipped leaders to broaden participation.

## REMEMBER THE SHARED VISION

State the broadening participation goals frequently and firmly to focus the Alliance's work.

## TIME

Make time, in person, to build relationships.

## SHARE

Consistently share the work being conducted by the Alliance internally and externally.



Biomedical Engineering: A Platform for STEM Outreach.  
NSF INCLUDES Conference. University of Akron.

# Alliance Spotlights

ASPIRE ALLIANCE



The vision of Aspire Alliance: The National Alliance for Inclusive & Diverse STEM Faculty (NSF 1834518, 1834522, 1834510, 1834513, 1834526, 1834521) is to develop inclusive and diverse STEM faculty across the nation by aligning and reinforcing professional development, hiring, and retention practices of STEM faculty simultaneously at institutional, regional, and national levels. Aspire has implemented aspects of an equity-focused Collective Impact approach to support leadership and change within the Alliance.



Aspire Alliance iChange Cohort.  
Photo Credit: Howard Gobstein, Executive Vice  
President, APLU; Co-Director, Aspire Alliance

“ The collaborative infrastructure of the alliance has provided a foundation that has allowed various teams to support one another as challenges have emerged. ”

-- Aspire Alliance

## HIGHLIGHTS

Aspire's work toward their vision is undertaken through three reinforcing change initiatives - **Regional Change**, **National Change**, and **Institutional Change**.

**Launched IChange Network with 15 institutions** initiating institutional self-assessments and high-investment campus action plans for more inclusive and diverse STEM faculty in higher education.

**Selected 20 inaugural IAspire Fellows** to enhance faculty leadership competencies, engage in a peer-leadership network, and implement institutional action projects.

**Created and facilitated five pilot National Change professional development (PD) workshops** about inclusive teaching, research mentoring, and faculty advising.

**Engaged 40 national partners** to accomplish their goals. These partners bring in expertise and aligned agendas to help create and sustain synergistic work.

Through **collaborative infrastructure**, the relationships, and partnerships the alliance built, Aspire teams have identified potential streams of funding to help support the adoption of inclusive STEM faculty practices.

# Alliance Spotlights

CAHSI ALLIANCE



The mission of Computing Alliance of Hispanic-Serving Institutions (CAHSI), (NSF 1834620) is to grow and sustain a networked community committed to recruiting, retaining, and accelerating the progress of Hispanics in computing through culturally relevant and engaging educational strategies and strategic regional and national partnerships. CAHSI employs a collective impact model to accelerate change in the number of Hispanics earning credentials in computing.



CAHSI celebrates World Kindness Day in collaboration with UTEP Association for Computing Machinery Women in Computing Women in Computer Science (ACMW WICS) students.  
Photo Credit: Computing Alliance of Hispanic-Serving Institutions and UTEP ACMW WICS

“ Collective Impact has guided us in considering what other institutions, non-profits, industry and other entities need to be included to accelerate change.” - CAHSI Alliance

## HIGHLIGHTS

**Began sub-regional efforts in New Mexico and Texas** to create a K-12 ecosystem to support computational thinking for students and provide professional development for teachers.

**Created three problem-solving courses** in collaboration with Google for students enrolled in computing courses adopted by CAHSI members and faculty outside of CAHSI.

**Created handbooks and other resources** to support the adoption of CAHSI signature practices at universities and regional leadership hubs.

**The CAHSI Annual Summit** in October 2018 featured a Hackathon, Cybersecurity Workshops, Technical Challenge sessions, and Industry – Faculty Exchange Sessions.

**Established Regional Networks** focused on localized interventions for change. Each Regional Network is steered by a Regional Lead who links people with resources and opportunities and works with a Regional Connector who provides on-the-ground support and takes on responsibility for the well-being of their community.

**Expanded to include two-year colleges, K-12 teachers and administrators**, and key industry partners such as Microsoft, Google, Lockheed Martin, and others. Some partner connections were made at the NSF INCLUDES meetings.

**Organized a two-day CAHSI INCLUDES Community Workshop** with a goal to bring together Hispanic researchers and researchers from HSIs to make recommendations on how to increase representation of Hispanics and HSIs in the NSF Computer and Information Science & Engineering (CISE) directorate's portfolio.

# Alliance Spotlights

## FIRST2 NETWORK ALLIANCE



The mission of the First2 Network Alliance (NSF 1834601, 1834569, 1834586, 1834575, 1834595) is to improve the college enrollment rate and success of undergraduate STEM students, with emphasis on rural, first generation students by providing STEM research experiences, peer mentoring and student advocacy.



First2 Network Summer Immersion Research Program  
- First2 Network Twitter Feed  
Photo Credit: First2Network

The First2 Network defines a first generation student as an individual for whom neither custodial parent or guardian has graduated from a 4-year institution.



## HIGHLIGHTS

**Established connections with industry and non-profit organizations** to build on-ramps for expanding broadening participation support to first-generation college students in West Virginia and submitted three collaborative grant proposals.

**Provided 30 first-generation rural college students with immersive summer internships**, which the Alliance reported significantly increased students' STEM self-efficacy, school belonging, and STEM identity.

**Trained students to serve as policy leaders and allies** for first-generation college students in West Virginia, including preparing presentations to the state legislature.

# Alliance Spotlights

IGEN ALLIANCE



The IGEN (Inclusive Graduate Education Network) Alliance (NSF 1834540, 1834528, 1834516, 1834545) mission is to increase the participation of underrepresented racial and ethnic minority students attaining a PhD in the physical sciences by institutionalizing inclusive, evidence-based recruitment, admissions, and retention practices.



Facilitators trained in equity-based holistic review at #IGEN19 National Meeting. Photo Credit: Julie Posselt, University of Southern California

“ We have to develop a welcoming attitude and understand the issues that are being faced by different groups. It takes a proactive stance for us sitting in the majority because this is not the problem of women and underrepresented minorities, this is the problem of the majority.” - Theodore Hodapp, Director of Project Development, APS Bridge Program

## HIGHLIGHTS

**IGEN members along with their partners conducted a train-the-trainer Holistic Review Institute** to enable equity-based holistic review of graduate applications at the 2019 IGEN Annual meeting in October. IGEN members conduct these workshops across the country throughout the year.

**The holistic admissions workshop has three broad aims:** 1) Raise awareness of barriers to access and inclusion presented by common admissions practices, 2) Facilitate self-study of current admissions routines, and 3) Develop plans to implement more inclusive admissions practices.

**Developed materials and held workshops for the Inclusive Practices (IP) Hub**, which provides inclusive practices resources for higher education departments to better recruit, support, and retain underrepresented graduate students.

**Facilitated placing 60 students in physics and chemistry graduate programs** by engaging graduate department partners through Bridge programs.

**Recruited 7 partner academic departments and 15 national laboratories** committed to recruiting underrepresented students into graduate programs, internships, and postdoctoral appointments.

**IGEN Partners, The American Chemical Society (ACS) and The American Geophysical Union (AGU)** launched Bridge Programs in 2019. The chemistry and geosciences bridge programs represent 20 departments across the country.

# Alliance Spotlights

STEM Core ALLIANCE



The mission of the STEM Core Alliance (NSF 1834628, 1834608) is to promote student advancement to calculus readiness, followed by continuing STEM internships and education. The alliance uses a network improvement community approach to share best practices, benefit from alliance-wide professional development, analyze data and evaluate the model's effectiveness, and identify additional funding streams to support the model beyond the current project.



STEM Core students start innovative STEM program at Santa Fe Community College as STEM Core Alliance trains a more diverse workforce. Photo Credit: Los Alamos National Lab

“ We believe in the promise of students. ”

- Dr. Sarah Miller, STEM Core PI, University of Colorado, Boulder

## HIGHLIGHTS

**As of Spring 2020 the STEM Core Expansion Network includes 34 community colleges** in California, Colorado, Maryland, New Mexico, and Washington; and five high schools in California, New Mexico and Maryland. The network also includes four workforce development boards and more than 30 employers, including three NASA centers and eight national labs.

**During the NSF INCLUDES Design and Development Launch Pilot Project** phase (NSF 1649381), 109 STEM CORE students received paid internships, and in the first year of the STEM CORE Alliance, 48 community college students received internships.

**The alliance recently partnered with** Navajo Tech, University of New Mexico Gallup, and Gallup-McKinley School District—all of which serve Native American students in rural McKinley County—to fill an urgent need for 400 new Engineering Technologists per year at Sandia and Los Alamos National Labs (LANL). The partnership is being developed in collaboration with the American Indian outreach programs at LANL, Sandia, and Lawrence Livermore Labs.

**Connected with national laboratories** to discuss how the STEM Core model can prepare students for entering technology career pathways via paid summer internships.

**Implemented the STEM Core model in community colleges** across California, Colorado, and Maryland. Enrolled 1,286 students in math learning and provided professional development for faculty and student support specialists.

**Hosted the first Annual STEM Core Convening** that included workshops for instructors and industry partners who recruited STEM Core students for paid summer internships.

# Alliance Spotlights

## NEW NSF INCLUDES Alliances

Funded FY 2019

### **STEM Pathways for Underrepresented Students to Higher Education (PUSH)**

The STEM Pathways for Underrepresented Students to Higher Education (PUSH) Network (NSF 1930990) will form a national network of precollege STEM programs to actualize their value through the creation, spread and scale of an equitable, evidence-based pathway for university admissions - precollege STEM program accreditation. The alliance, led by the University of Pittsburgh in partnership with the STEM Learning Ecosystem Community of Practice, will bring together precollege STEM programs, STEM and culturally responsive pedagogy experts, formal and informal education practitioners, college admissions professionals, the accreditation sector, and other higher education representatives.

### **STEM Opportunities in Prison Setting (STEM-OPS)**

STEM Opportunities in Prison Settings (STEM-OPS, NSF 1931045), will work to make educational programming for STEM careers and college study commonplace, accessible, and rigorous in U.S. prisons and reentry programs. The project is led by the Education Development Center, a non-profit education company, in partnership with From Prison Cells to PhD; Operation Restoration; the Initiative for Race Research and Justice at Vanderbilt; and the Prison Teaching Initiative at Princeton.

## Supporting Emerging Aquatic Scientists (SEAS)

The Supporting Emerging Aquatic Scientists (SEAS) Islands Alliance (NSF 1930852, 1930857, 1930869, 1930910, 1930991, 1930998) will establish a national network focused on coastal geoscience pathways in seven U.S. or U.S.-affiliated island jurisdictions to develop and support an inclusive geoscience workforce that is connected to the nation's STEM enterprise. Led by the University of The Virgin Islands, the alliance will use a collective impact, culturally-relevant approach to connect and empower youth, undergraduates, graduates, and post-graduate adults within the network through a shared vision, goals and metrics, scientific and professional development trainings, mentorship, family support programs, and cohort-building marine and environmental sciences opportunities. It builds on two successful NSF INCLUDES Design and Development Launch Pilots and is composed of an extensive network of partners in the U.S. Virgin Islands, Puerto Rico, Guam, Commonwealth of the Northern Mariana Islands, Republic of Palau, Federated States of Micronesia, and the Republic of the Marshall Islands.

# Connecting to the National Network

## Corporate Connections

The Boeing Company became the first corporation to contribute to the NSF INCLUDES National Network with a gift of \$1 million. With this support, NSF announced Dear College Letter NSF 19-038, to support women returning to the STEM workforce after a career break, with particular interest in women veterans. As a result of the DCL, student traineeships and conferences were funded to develop and understand the STEM knowledge base, skills, and competencies of undergraduate and graduate students after a career break.



Former NSF Director, Dr. France Córdova, with Heidi Capozzi,  
Senior Vice President of Human Resources at Boeing.  
Photo Credit: NSF

A January 2020 NSF INCLUDES National Network Blog post featured some of the students supported through the traineeships. Below are highlights from the blog post. The complete post is available on the NSF INCLUDES National Network website, [www.includesnetwork.org](http://www.includesnetwork.org).



“I am very fortunate to return to my alma mater, Purdue University’s School of Construction Management Technology, as a Ph.D. student studying women in construction through this NSF INCLUDES program,” said trainee Candice Sexton. “As a returning woman student who has worked in the construction field in both the transportation sector and marketing/communications areas, this once-in-a-lifetime opportunity provides for my advanced education with the goal of increasing the long-term participation of women in the construction industry.”

Candice Sexton, Purdue University Photo Credit: Candice Sexton



At the Mississippi State Center for Advanced Vehicular Systems, Dr. Karen Persons performs fatigue testing on the stretch sensor-based foot-ankle wearable sensor solution, to determine the life cycle of the future smart sock that will be produced by the Athlete Engineering program for use by the student-athletes.

Dr. Karen Persons, Mississippi State Photo Credit: Karen Persons



The NSF INCLUDES Re-Entry Traineeship has allowed Stacy Alexander to continue her career as an engineer. When Stacy Alexander became a part-time Master’s student in Electrical and Computer Engineering at the University of Texas at San Antonio in fall 2016, she thought that with a lack of child care and tight budget, she would not earn her degree until late 2020. Instead, Alexander became a Ph.D. student in fall 2019 thanks to a traineeship, Stacy is studying Cybersecurity for the Internet of Things.

Stacy Alexander, University of Texas at San Antonio Photo Credit: Stacy Alexander

# Connecting to the National Network

## Federal Partnerships

Partnerships and the collaborations they generate are key to supporting excellence in STEM research and broadening participation in STEM. In November 2018, former NSF Director, Dr. France Córdoba, extended an invitation to federal agency leaders to join NSF INCLUDES. To date, eight agencies have become federal partners in the initiative: Department of Defense, Department of Education, National Aeronautical and Space Administration, National Institutes of Health, National Institute of Standards and Technology, National Oceanic and Atmospheric Administration, United States Geological Survey, and the United States Patent and Trademark Office. These federal agency partners have committed to seeking ways to advance diversity and inclusion within and across agencies; helping develop common metrics to define success; and leveraging public-private partnerships to prepare the next generation of the STEM workforce.

An example of an activity that has been developed as a result of federal agency partnership is an effort focused on broadening participation in engineering, jointly led by NASA. Through the Office of STEM Engagement's Minority University Research and Education Project, NASA will support collaborations between minority-serving institutions (MSIs) and other organizations, including other MSIs and the existing NSF INCLUDES community, in order to broaden participation in the engineering workforce.



As members of the NSF INCLUDES National Network, federal agency partners have the opportunity to:

- 1.** Develop and enrich strategic partnerships in alignment with the federal Five-Year Strategic Plan for STEM Education: Charting a Course for Success: America's Strategy for STEM Education.
- 2.** Communicate available STEM opportunities (e.g., grants, fellowships, etc.) to NSF INCLUDES Alliances, Launch Pilots, and other NSF INCLUDES Network members.
- 3.** Receive access to NSF INCLUDES Network resources.
- 4.** Contribute to a database of best practices in broadening participation through data, research findings, and other types of evidence.



# Connecting to the National Network

## The Future of NSF INCLUDES

The NSF INCLUDES  
Network is rapidly growing.

On September 9, 2019, NSF INCLUDES released a Planning Grants Solicitation (NSF 19-600) to support catalytic planning efforts necessary to build capacity to establish future centers, alliances, or other large-scale networks endeavoring to address a broadening participation challenge in STEM at scale. On May 4, 2020, NSF INCLUDES released an Alliance Solicitation (NSF 20-569) to support the establishment and growth of new Alliances that employ a collaborative infrastructure approach to address a critical broadening participation challenge in STEM at scale.

# NSF INCLUDES Team Members

## LEADERSHIP TEAM

AD EHR	Karen Marrongelle
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SBE	Kurt Thoroughman Joe Whitmeyer Peter Vishton
OIA	Bernice Anderson Jolaina Jeff-Cartier Rebecca Kruse Cynthia Phillips

# JOIN the National Network

The NSF INCLUDES Coordination Hub (NSF 1818635) leads and supports the NSF INCLUDES National Network.



Greg Robinson, the UGA Foundation Distinguished Professor of Chemistry, is the lead faculty member coordinating UGA's participation in the Aspire Alliance IChange Network. Photo Credit: Peter Frey, UGA



UTEP ACMW WICS students working with CAHSI to promote kindness. Photo Credit: Computing Alliance of Hispanic-Serving Institutions and UTEP ACMW WICS



Student poster session at the 2017 Louis Stokes Midwest Regional Center of Excellence. Photo Credit: NSF

Joining the NSF INCLUDES National Network can amplify efforts to realize equity and inclusion in STEM, via:

Promoting stories about your work with colleagues in STEM professions

Strengthening your capacity to collect, analyze, and use data for decision-making and continuous learning

Developing shared definitions for success that are aligned with nationally recognized STEM best practices

Participating in an online community and affinity groups – where you can learn from peers, learn about conferences, and access resources



Graduate students and staff of the 2019 IGEN National Meeting at the University of Central Florida. Photo Credit: Carlos Romero - Romero Photoworks

The online NSF INCLUDES National Network is open to all interested in improving diversity and inclusion in STEM.

Join at [www.INCLUDESNetwork.org](http://www.INCLUDESNetwork.org)



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