Expanding Networked Communities to Achieve Research Competitiveness: Emerging Activities at NSF

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Chief Operating Officer
National Science Foundation

NSF EPSCoR PI Annual Meeting
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The tenets of the EPSCoR program are central at NSF.

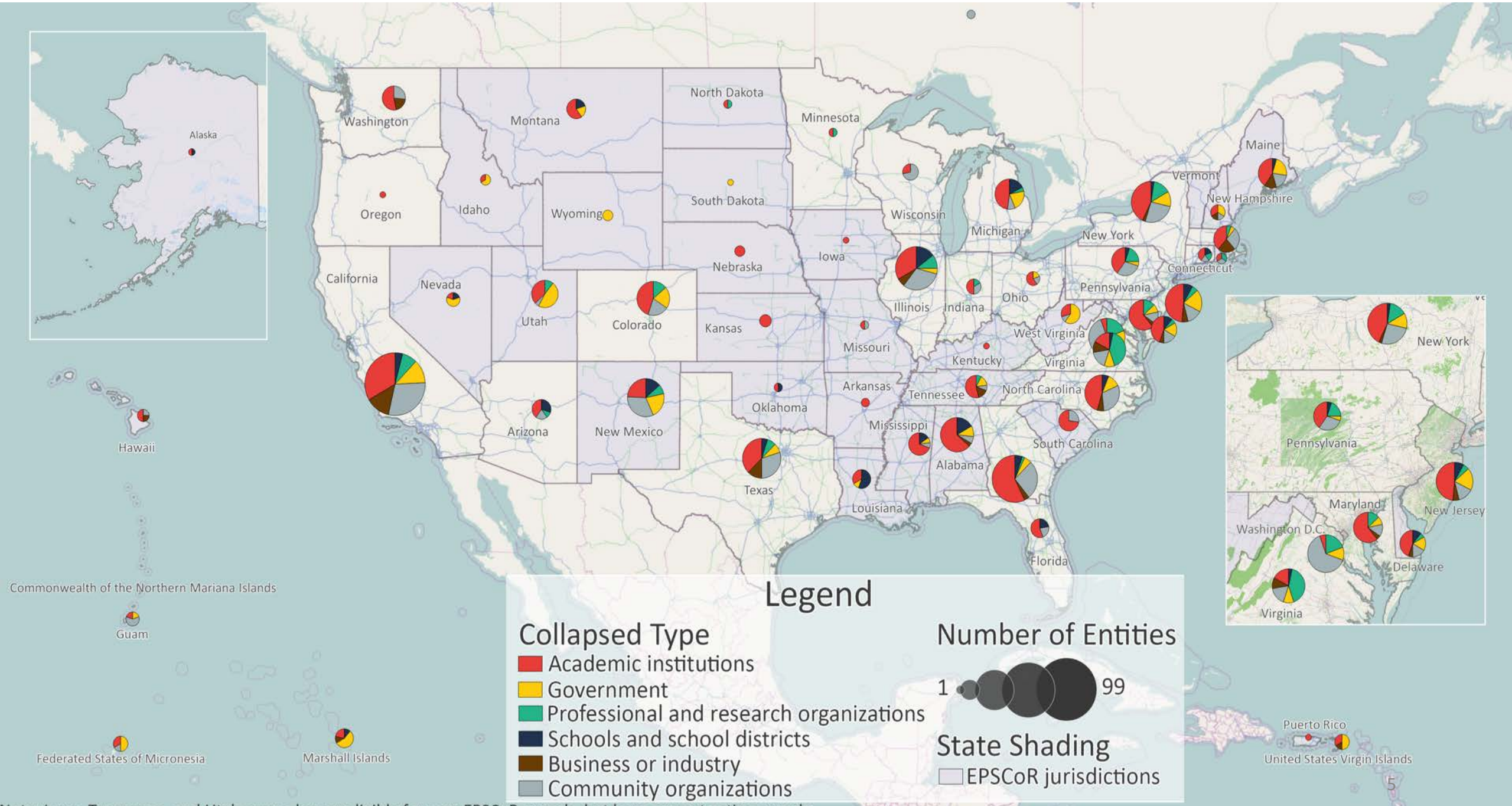
- "Science and engineering talent can be found among young people in every state" (NAS, 2013, p.1)
- EPSCoR programs are "designed to ensure that all states are capable of participating in the nation's research enterprise…" (NAS, 2013, p. 1)
- NSF EPSCoR is in part a response to the NSF 1950 organic act that requires NSF to "Avoid undue concentration of such research and education [in science and engineering.] (NSF Organic Act, 1950)
- EPSCoR was not intended as an entitlement, but rather as a catalyst." (Lambright, 2000, in Hauger and McEnaney)

Current NSF EPSCoR goals align with NSF priorities.

- Catalyze the development of research capabilities and the creation of new knowledge
- Broaden direct participation of diverse individuals, institutions and organizations
- Establish sustainable STEM education, training, and professional development pathways
- Effect engagement at the academic, government and private-sector levels
- Impact research, education and economic development

EPSCoR is building research capacity through networked communities!

- participants from all four RII tracks, early career through senior researchers, and other key project personnel, and representatives of inter-jurisdictional partnerships at this meeting
- in FY 2015-2017, EPSCoR jurisdictions have been awarded over $2.7B; EPSCoR funding accounts for only 18.9% of this. Greater than **5 X** leveraging!
- 66 research centers created in EPSCoR jurisdictions as a direct result of the program
- 100-plus new degree programs established, including 64 new Ph.D. programs



Note: Iowa, Tennessee, and Utah are no longer eligible for new EPSCoR awards, but have current active awards.

Highlights: Emerging Activity at NSF

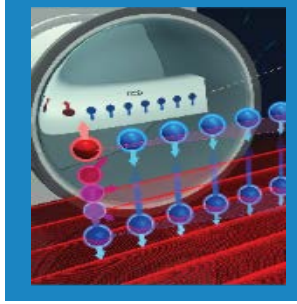
RESEARCH IDEAS

Harnessing the Data Revolution

The Future of Work at the Human-Technology Frontier

Navigating the New Arctic

Windows on the Universe: The Era of Multi-messenger Astrophysics



The Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

PROCESS IDEAS

Mid-scale Research Infrastructure

NSF 2026: Seeding Innovation

Growing Convergence Research at NSF

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

RESEARCH IDEAS

NSF 17-598

NSF 18-548

NSF 17-561

NSF 16-574

NSF 18-542

NSF 18-047

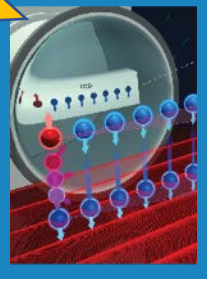
Harnessing Data for 21st Century Science and Engineering

The Future of Work at the Human-Technology Frontier

Navigating the New Arctic

NSF 18-048

Windows on the Universe: The Era of Multi-messenger Astrophysics



The Quantum Leap: Leading the Next Quantum Revolution

NSF 18-046

NSF 18-051

Understanding the Rules of Life: Predicting Phenotype

NSF 18-031

PROCESS IDEAS

NSF 17-592

Mid-scale Research Infrastructure

NSF 2026: Seeding Innovation

NSF 17-065

NSF 18-058

Growing Convergence Research at NSF

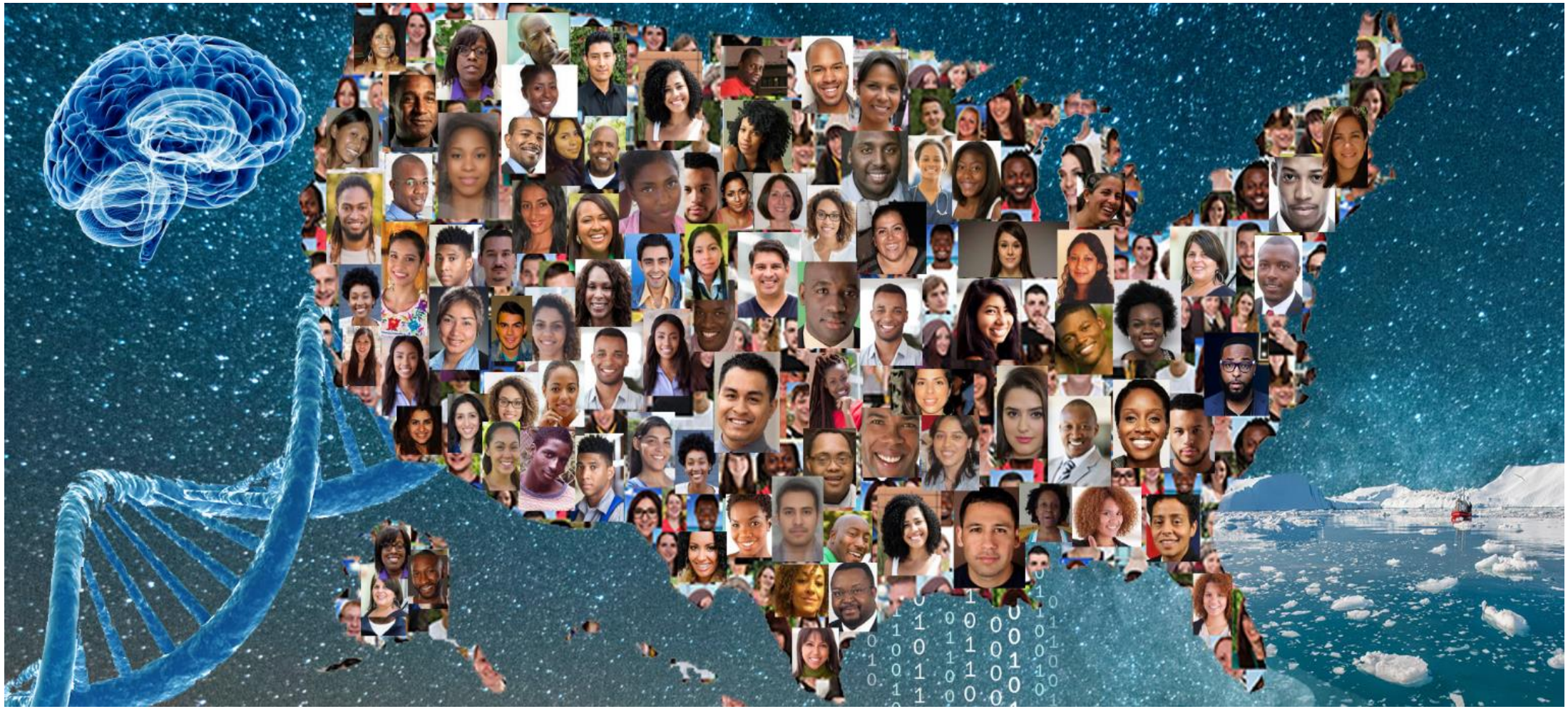
NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

NSF 17-111

NSF 18-529

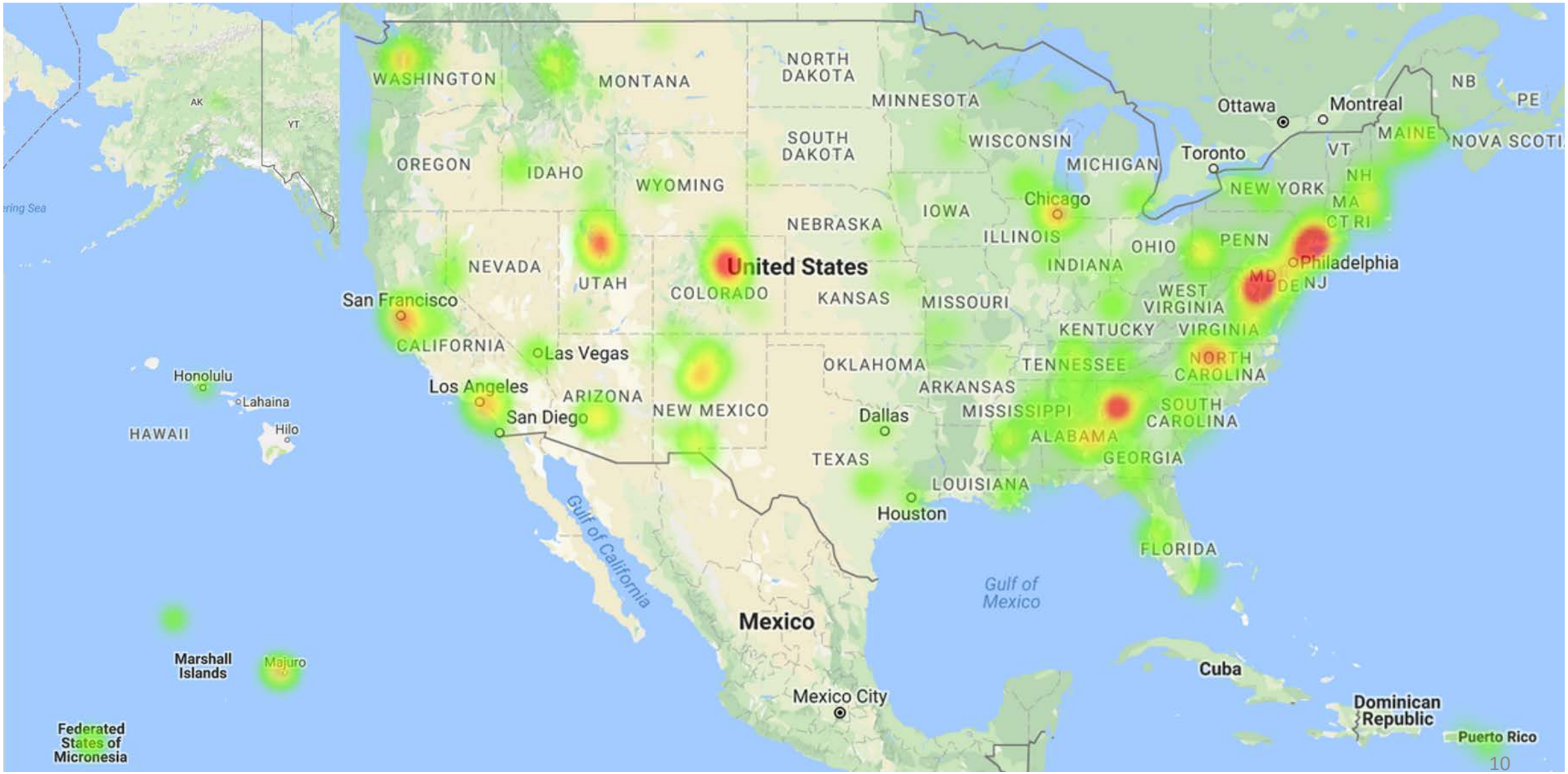
NSF 17-591

NSF INCLUDES is based on the idea of networked communities and is linked to EPSCoR.

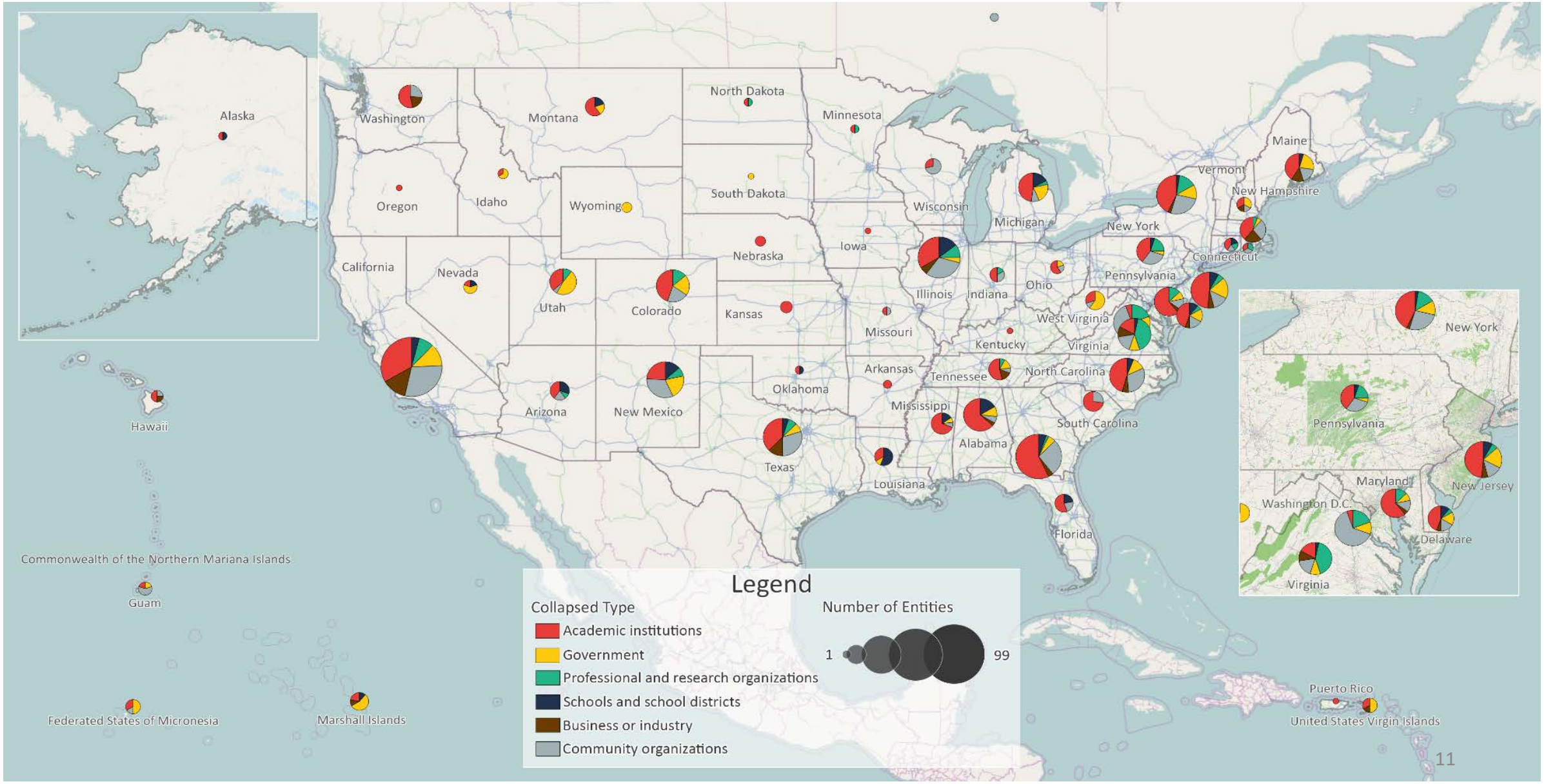


NSF INCLUDES Launch Pilots

69 Launch Pilots Funded by December 2017



NSF INCLUDES Entities by Collapsed Type Within Each State, Territory, and Associated State



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ON-RAMPS to NSF INCLUDES NATIONAL NETWORK

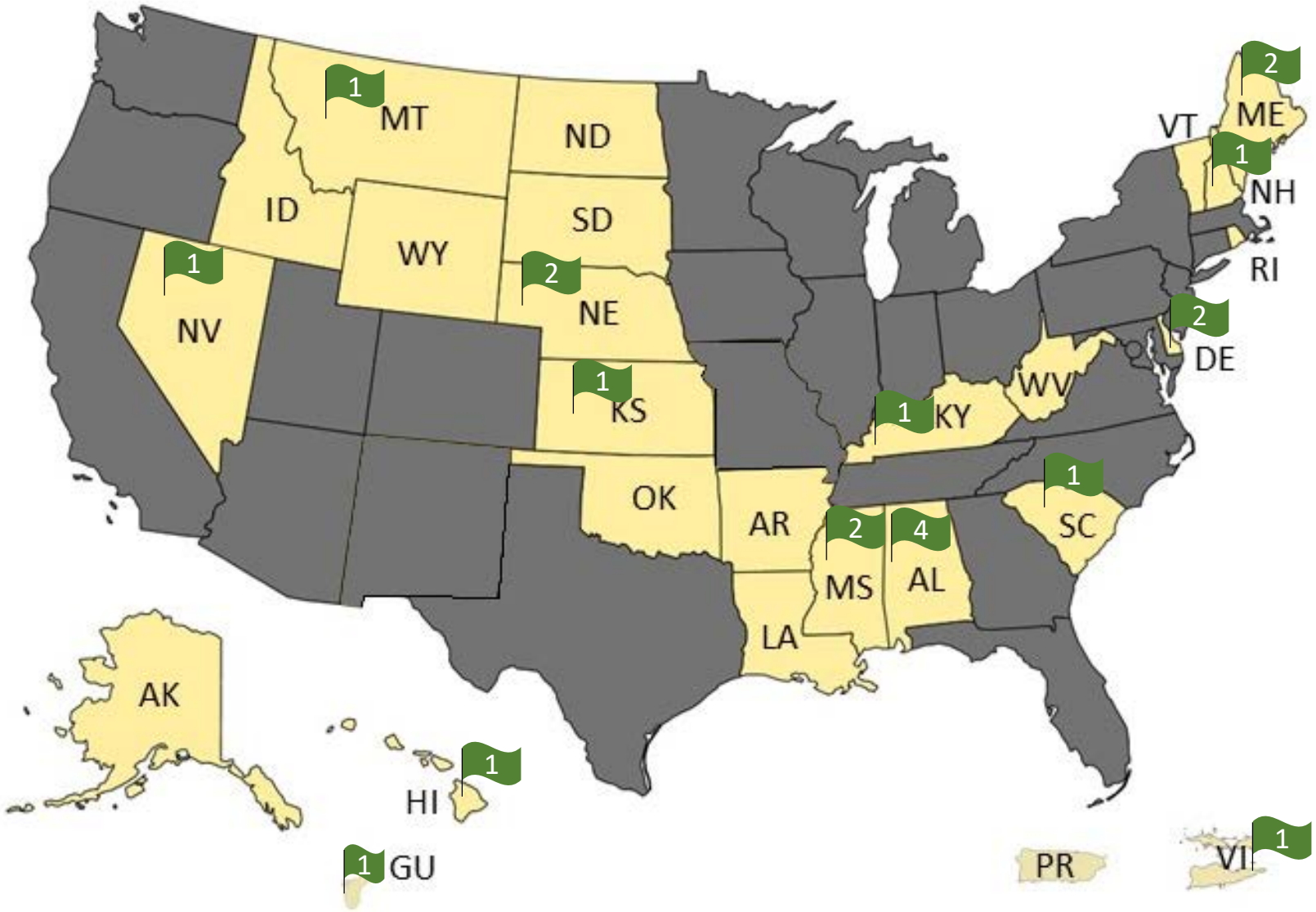
NSF 17-111

Dear Colleague Letter: Announcement of an Effort to Expand the NSF INCLUDES National Network

July 14, 2017

Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES) is a comprehensive effort to enhance U.S. leadership in science and engineering discovery and innovation by proactively seeking and effectively developing science, technology, engineering and mathematics (STEM) talent from all sectors and groups in our society. As one element of its multi-faceted approach to NSF INCLUDES, NSF is currently focusing on and identifying novel ways in which new and currently-funded NSF projects from across all NSF directorates can engage with the NSF INCLUDES National Network. We have called this process building "on-ramps" to the NSF INCLUDES National Network. To do this, we encourage the submission of funding requests for i) Early-concept Grants for Exploratory Research (EAGER), ii) Conferences and Workshops, and iii) Supplements to existing NSF-funded grants.

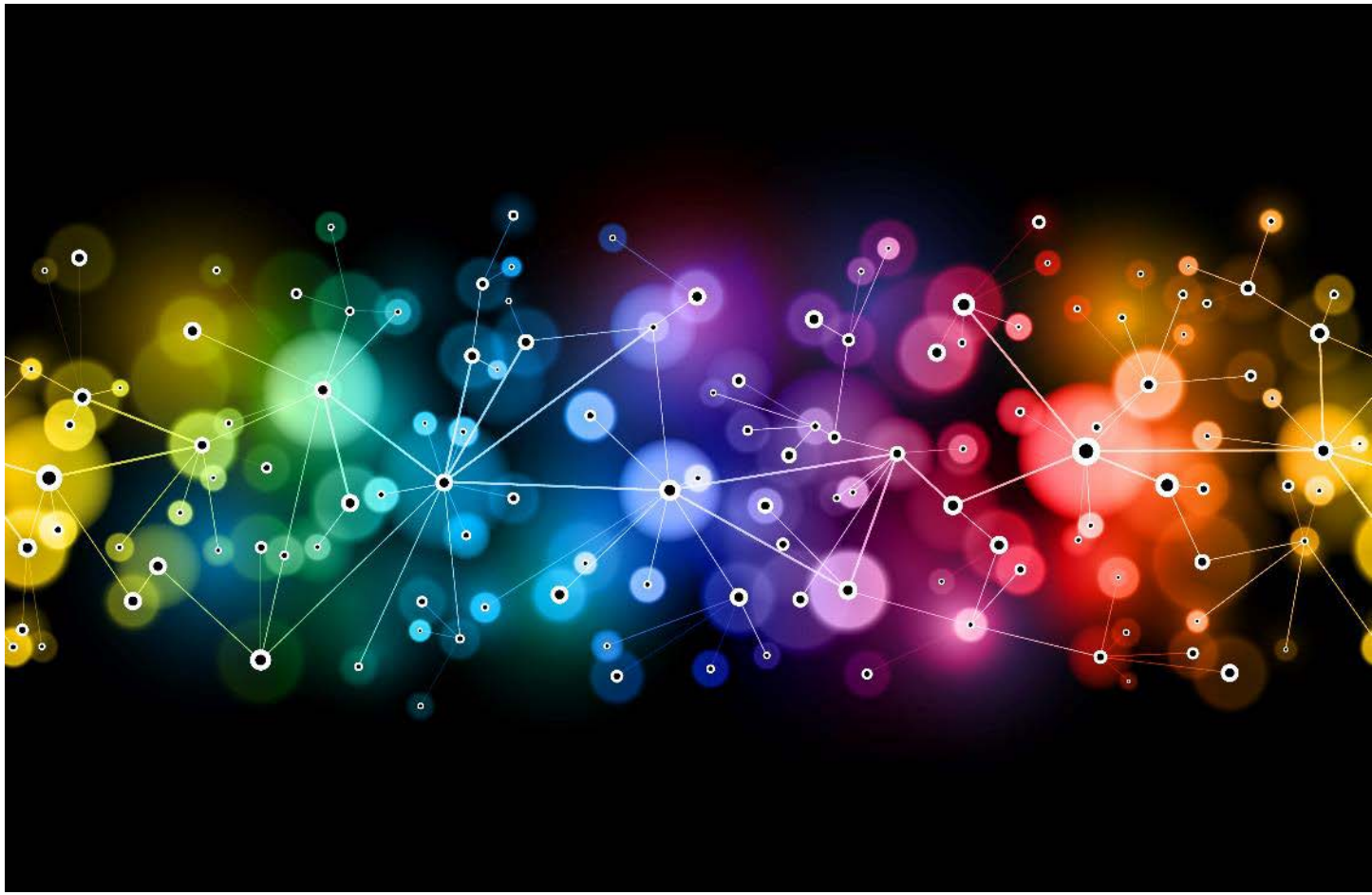
NSF INCLUDES Awards to EPSCoR Institutions



Growing Convergence Research at NSF: NSF 18-058

Research driven by a specific and compelling problem.

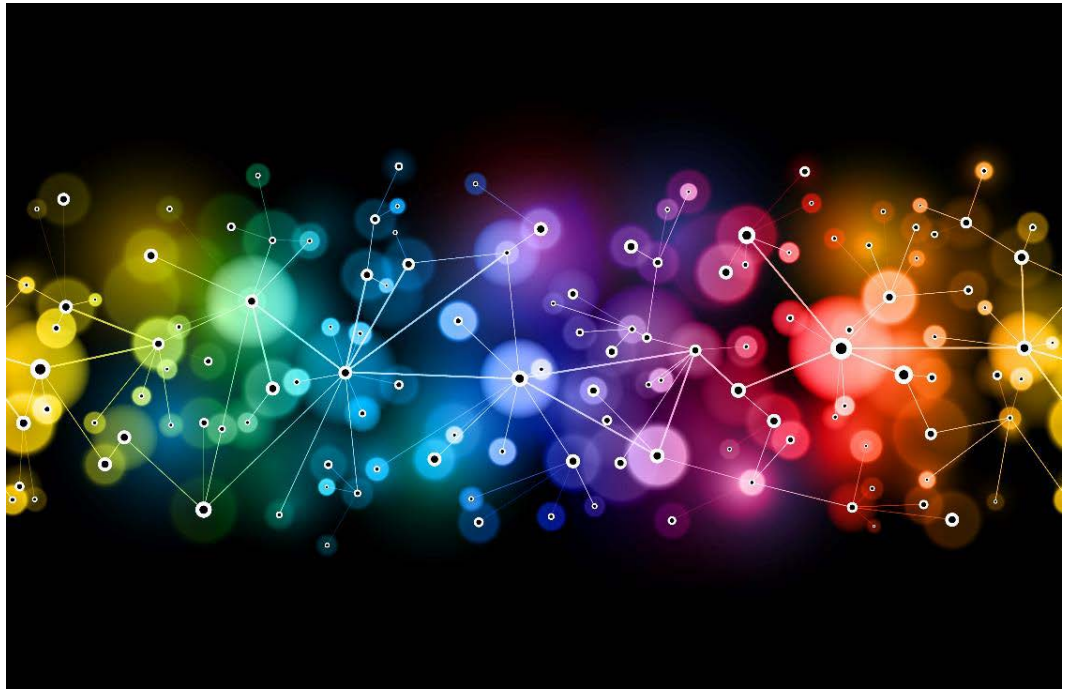
Deep integration across disciplines.



Growing Convergence Research at NSF: NSF 18-058

NSF encourages the submission of prospectuses to identify new areas and specific projects:

- outline novel approaches and research strategies that are likely to result in a clear demonstration of the potential for transformative advances
- to compete for FY 2019 funding submit a prospectus describing a new area of research and an exploratory research project by October 15, 2018



Convergence Accelerators:
A New Model for Research to Innovation

What is a Convergence Accelerator?

- A new organizational structure intended to leverage external partnerships to accelerate convergent and translational activities in an area of national importance
- A home for application-driven basic research
- Advances ideas from concept to deliverables

Key Characteristics

- Fed by basic research & discovery
- Adopts convergent approach
- Cohorts, integrated teams
- Intentional in outcomes
- Proactively and intentionally managed
- Seed investment, competition
- Intensive education
- Mentorship
- Attracts partnerships
- Fixed term

How do CAs differ from Foundational Research?

- CAs are intentional in outcomes, more goal-oriented
- CAs feed on the tension between top-down direction setting and bottom-up creative approaches

Convergence Accelerator Phases

NSF PIs, partners, basic research results,

0: Team Seeding

- Organic or through structured workshops
- Multi-disciplinary
- Diverse membership

Review

1: Team Formation

- Cohorts of ~20 teams in 3-5 tracks
- ~6 months
- **Ideation**
- **Convergence**
- **Team dynamics**

Pitch

2: Accelerated Research

- Large grants to selected teams
- Semi-annual or annual reviews
- Maintain cohort structure

Compete

Prize(s)

Unique NSF Expertise, combined in new ways, designed to decrease time to discovery

- Convergence Accelerators build on NSF innovations and best practices
  - Network model: I-Corps (Teams and Cohorts)
  - Collective Impact: NSF INCLUDES
  - Team Development: Ideas Labs
  - Industry-inspired Workshop on Quantum (Mar. 2018): Industry wants more similar workshops on HDR and FW-HTF topics (and URoL)
- Convergence Accelerators add new dimensions
  - Selection by pitch, instead of 15-page research proposal
  - Competition for monetary prizes

How will the research in a CA be defined?

- NSF will start with a few “Tracks” that define focus areas within the accelerator
- Each track will have specific goals (outcomes, deliverables)
- NSF will host workshops both to form teams and to solicit additional tracks recommended by the community

Example Accelerator "Tracks": Harnessing the Data Revolution

- Advanced science data infrastructure that is interoperable and has an open architecture (makes it easier to access and link heterogeneous data products)
- Open Knowledge Network – an open semantic information infrastructure to discover new knowledge from multiple disparate knowledge sources

Example Accelerator "Tracks": Future of Work at the Human-Technology Frontier

- Smart manufacturing environment: Adaptive collaboration between humans and machines using artificial intelligence
- The Instrumented Classroom: Intelligent cognitive assistants in a smart classroom to enhance student learning
- Cybersecurity at scale: Identifying and mitigating vulnerabilities using artificial intelligence

National Science Foundation

THE NSF 2026 IDEA MACHINE

- Entrants suggest new "Big Ideas" for future investment
- Open to all
- Public comments; blue-ribbon panel
- Best ideas receive public recognition, cash prizes, and other awards

Finding "Big Ideas 2.0": Identifying new directions for research.

STEP 01	STEP 02	STEP 03	STEP 04	STEP 05	STEP 06	STEP 07	STEP 08	STEP 09	STEP 10
Competition opens/ entries accepted	NSF staff select 30 competitive entries	Videos invited & posted online	Public comments collected; NSF analysis added	Blue-Ribbon Panel picks 12 entries for remote interviews	Blue-Ribbon Panel recommends 6 entries to NSF	NSF staff add analysis/ recom-mendations	NSF Leadership selects 2-4 winning entries	Prizes awarded for winning ideas	New Big Idea funding opportunities developed

Our Mission: EPSCoR Projects are advancing it!