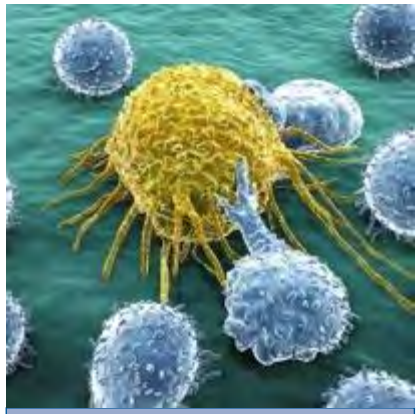
THE NATIONAL SCIENCE FOUNDATION: WHERE DISCOVERIES BEGIN

Erwin Gianchandani
National Science Foundation

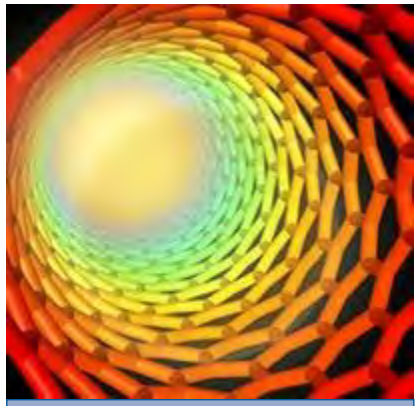
NSF Grants Conference
October 2021

The NSF Mission

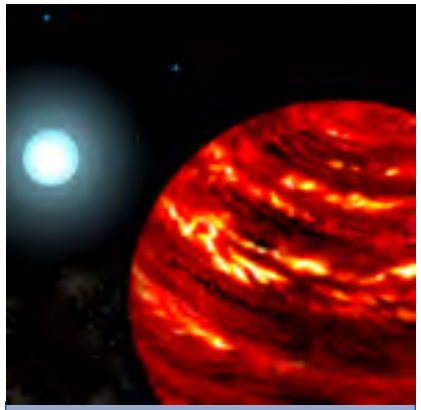
NSF Advances All Fields of Science & Engineering



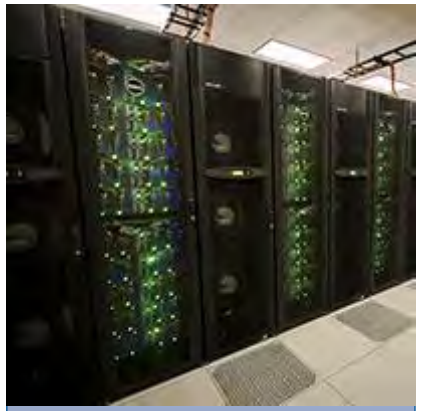
Biological Sciences



Engineering



Mathematical & Physical Sciences



Computer & Information Science & Engineering

Geosciences (including Polar Programs)

Integrative Activities

Education & Human Resources

Social, Behavioral & Economic Sciences

International Science & Engineering

ADVANCING SCIENCE AND TECH TO ADDRESS NATIONAL NEEDS

ENABLING OPPORTUNITY EVERYWHERE

GLOBAL LEADERSHIP AND COMPETITIVENESS

The Future of Research

Sun's Surface

The Future of Research

The Future of Research

The Future of Research

ERC for Advanced Technologies for Preservation of Biological Systems

ERC for Advancing Sustainability through Powered Infrastructure for Roadway Electrification

ERC for Quantum Networks

ERC for the Internet of Things for Precision Agriculture

The Future of Research

Broadening Participation/STEM Education

Women

Hispanic or Latino

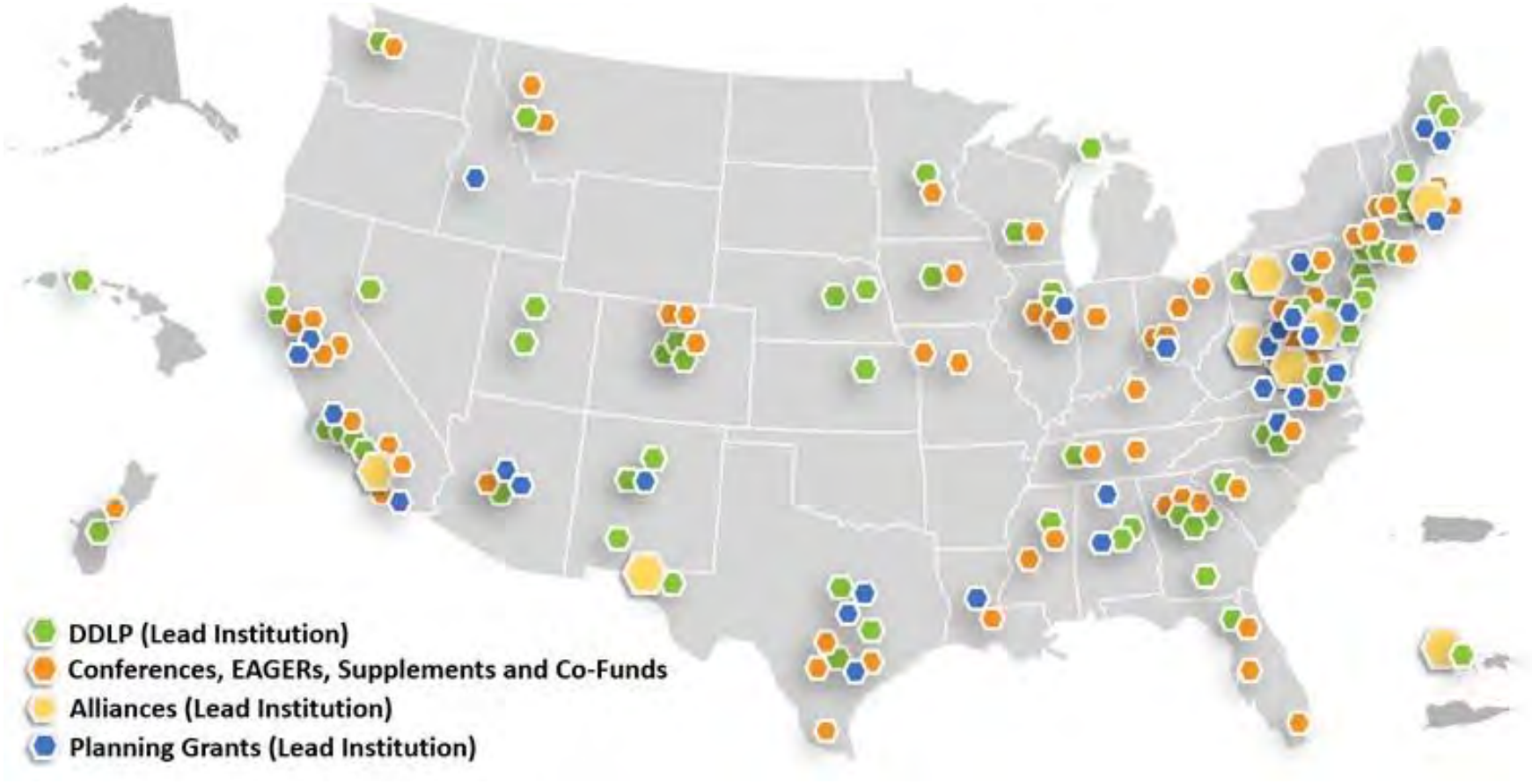
Black or African American

American Indian or Alaska Native

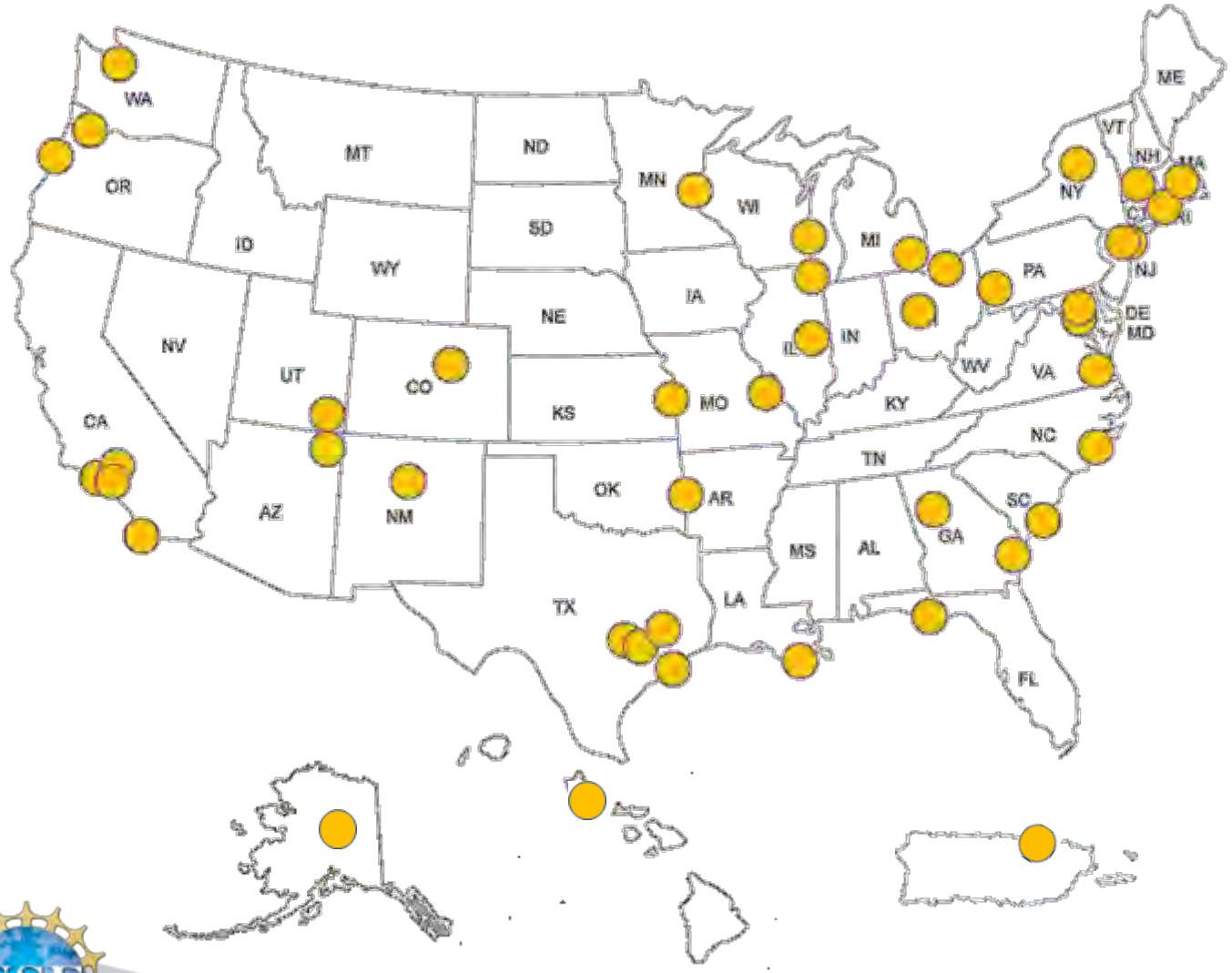
x 100,000 people in 2021 in the S&E workforce

x 100,000 additional people needed in 2030 for the S&E workforce to be representative of the U.S. population

Broadening Participation/STEM Education: NSF INCLUDES



Broadening Participation/STEM Education: CIVIC



Civic-academic project teams across the US are developing **research-based pilot projects** in response to community-identified priorities

Communities & Mobility	Resilience to Natural Disasters
21 Projects	31 Projects

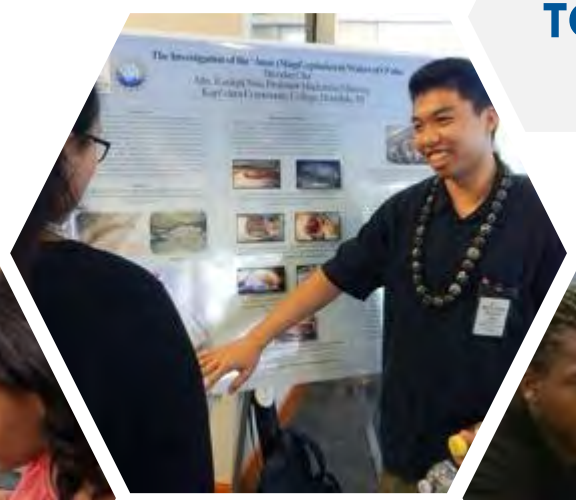
Both tracks include projects focused on the pandemic

Inspiring Talent Everywhere

GRFP

ADVANCE

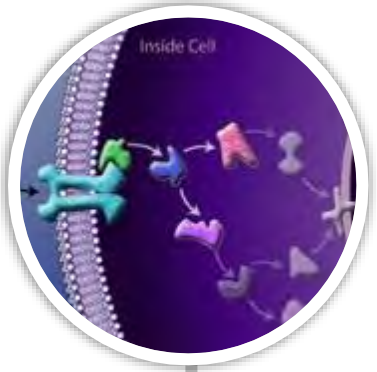
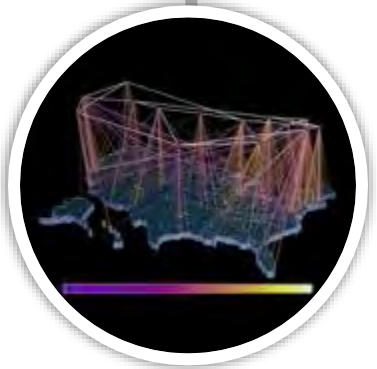
TCUP



HBCU

HSI

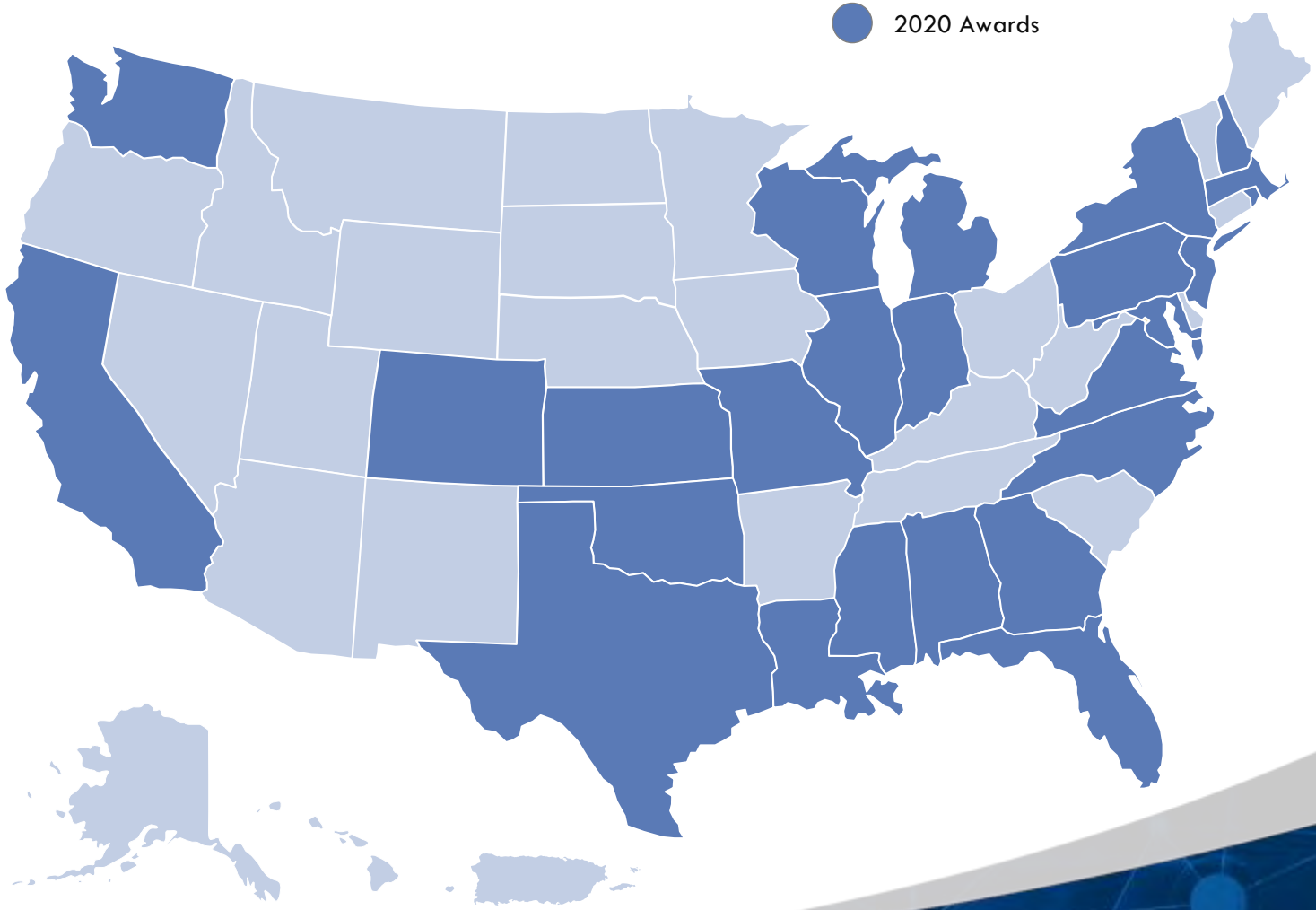
Artificial Intelligence (AI)

	1970s: MACHINE LEARNING	1970s: NATURAL LANGUAGE PROCESSING	1980s: BAYESIAN NETWORKS	1980s: INTELLIGENT TUTORING SYSTEMS	1990s: MEASURING FACIAL EXPRESSIONS IN SBE
NSF INVESTMENTS					
CURRENT IMPACTS					
	DEEPSCALE: VISION SYSTEMS FOR SELF-DRIVING CARS	**SPEECH RECOGNITION SOFTWARE**	**MEDICAL DIAGNOSIS, TRAFFIC PREDICTION AND ROUTING, SPAM FILTERS**	**AI INSTITUTE FOR STUDENT-AI TEAMING**	**EMOTIENT STARTUP**

AI Research Institutes

2020 AWARDS

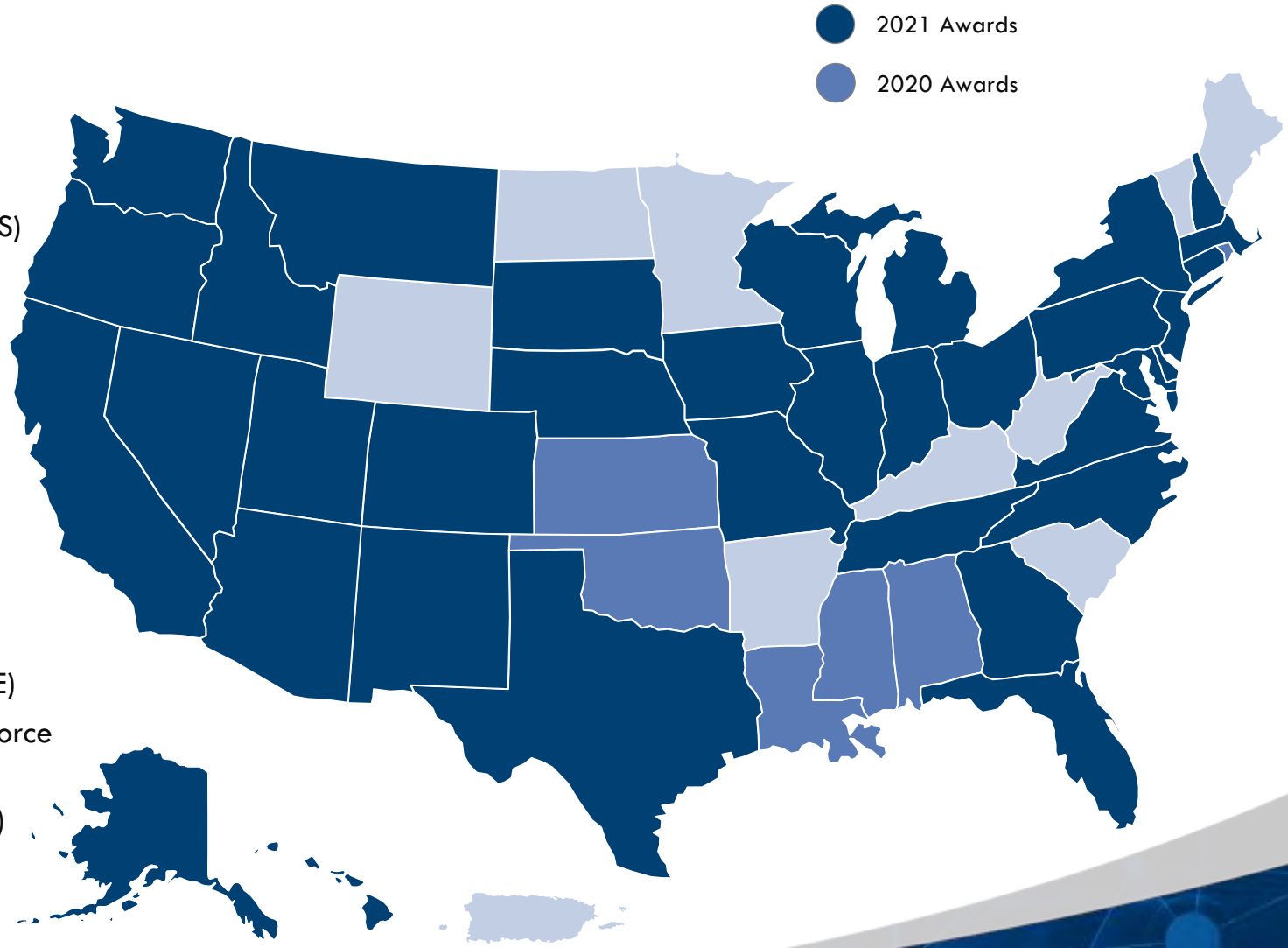
- NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography
- NSF AI Institute for Foundations of Machine Learning
- USDA-NIFA AI Institute for Next Generation Food Systems
- USDA-NIFA AI Institute for Future Agricultural Resilience, Management, and Sustainability (AIFARMS)
- NSF AI Institute for Student-AI Teaming
- Molecule Maker Lab Institute (MMLI): NSF AI Institute for Molecular Discovery, Synthetic, and Manufacturing
- NSF AI Institute for Artificial Intelligence and Fundamental Interactions



AI Research Institutes

2021 AWARDS

- NSF AI Institute for Collaborative Assistance and Responsive Interaction for Networked Groups (CARING)
- NSF AI Institute for Learning-enabled Optimization at Scale (TILOS)
- NSF AI Institute for Optimization
- NSF AI Institute for Intelligent Cyberinfrastructure with Computational Learning in the Environment (ICICLE)
- NSF AI Institute for Future Edge Networks and Distributed Intelligence (AI-EDGE)
- NSF AI Institute for Edge Computing Leveraging Next-generation Networks (Athena)
- NSF AI Institute for Dynamic Systems
- NSF AI Institute for Engaged Learning
- NSF AI Institute for Adult Learning and Online Education (ALOE)
- USDA-NIFA AI Institute: Agricultural AI for Transforming Workforce and Decision Support (AgAID)
- USDA-NIFA AI Institute: AI Institute for Resilient Agriculture (AIIRA)



ADVANCING SCIENCE AND TECH TO ADDRESS NATIONAL NEEDS

ENABLING OPPORTUNITY EVERYWHERE

GLOBAL LEADERSHIP AND COMPETITIVENESS

FY22 President's Budget Request

- $10.17 billion for NSF, a 20% increase
- Enhance fundamental research and development
- $1.2B for climate and clean energy related research
- $100M for broadening participation
- New Technology Directorate
- Construct major research facilities
- Strengthen U.S. leadership in emerging technologies

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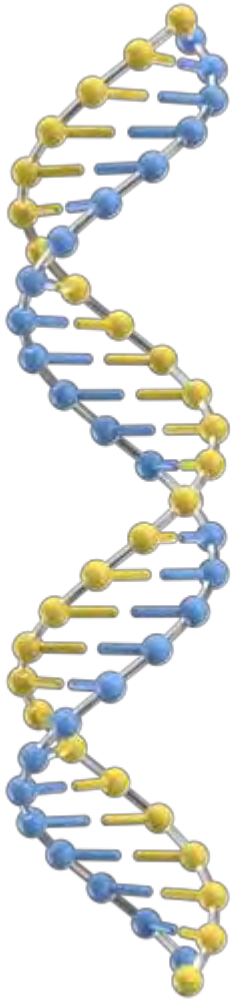
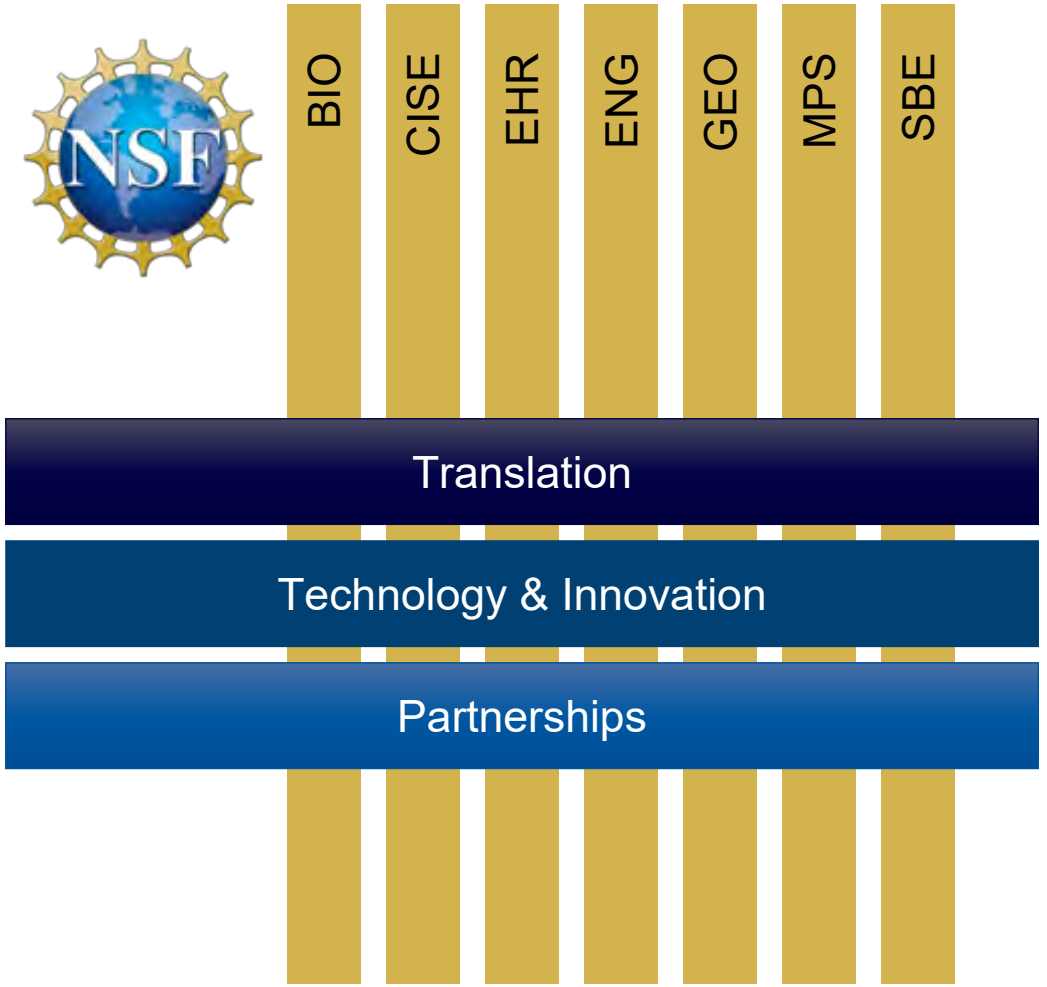
Designing for the Future: A New Horizontal






USDA-NIFA
PAWR
CSforALL
Resilience
CCIC
RINGS
Simons Foundation
ASU
AccelNet

Platforms for Advanced Wireless Research (PAWR)

POWDER

Salt Lake City, UT

Software defined networks and massive MIMO

COSMOS

West Harlem, NY

Millimeter wave and backhaul research

AERPAW

Raleigh, NC

Unmanned aerial vehicles and mobility

ARA

Ames, IA

Rural broadband

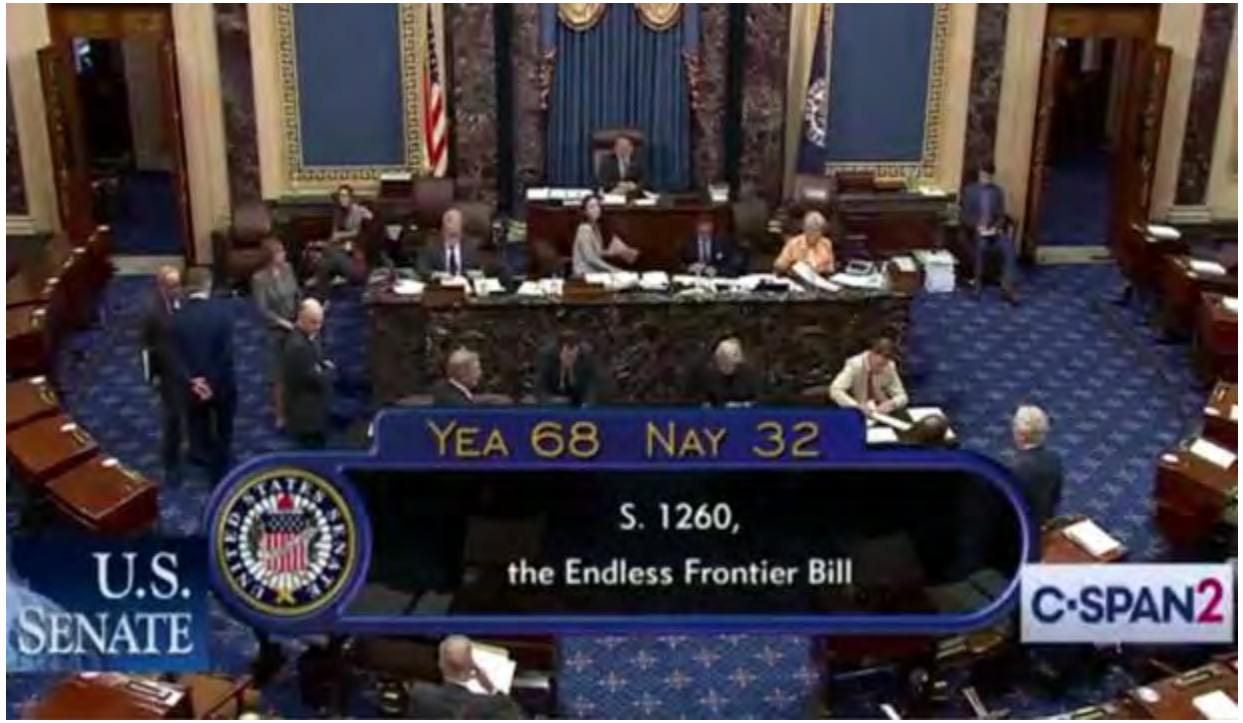
$100M partnership with >35 companies
accelerating beyond-5G wireless research

US Innovation and Competition Act

"[T]he Director shall establish a program . . . to make awards, through a competitive selection process, to eligible entities to establish university technology centers.

PURPOSE.—The purpose of the university technology centers shall be to—

- (A) conduct multi-disciplinary, collaborative basic and applied research, relevant to at least one of the key technology focus areas;
- (B) leverage the expertise of multi-disciplinary and multi-sector partners, including partners from private industry; …
- (D) support the development of scientific, innovation, entrepreneurial, and educational capacity within the region of the university technology center."



NSF of the Future Act

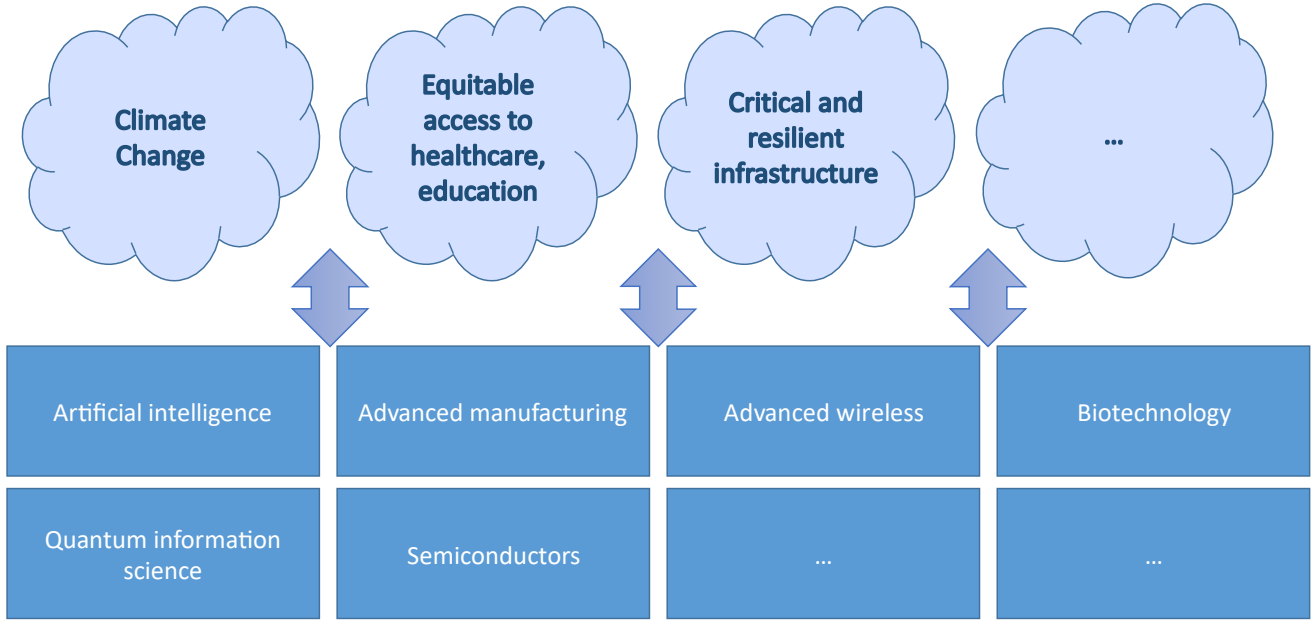
"The Director may award grants and cooperative agreements to institutions of higher education, or consortia thereof, for the planning, establishment, and support of Technology Research Institutes in key technology areas…

USES OF FUNDS.—Funds awarded under this section may be used by a Technology Research Institute to—

- (A) conduct fundamental research to advance innovation in a key technology;
- (B) conduct research involving a key technology to solve challenges with social, economic, health, scientific, and national security implications;
- (C) … partnership with other Federal agencies … industry … labor organizations, civil society organizations, and … Tribal governments; …
- (G) establish traineeship programs … and by providing graduate students opportunities for research experiences in government or industry…

Cultivating Regional Innovation Ecosystems

- Cultivate new regional innovation ecosystems throughout the U.S.
- Advance critical and emerging technologies, address societal challenges
- Balance technical and geographic innovation
- Iterative co-design/co-creation through intentional engagement of broad, diverse stakeholders

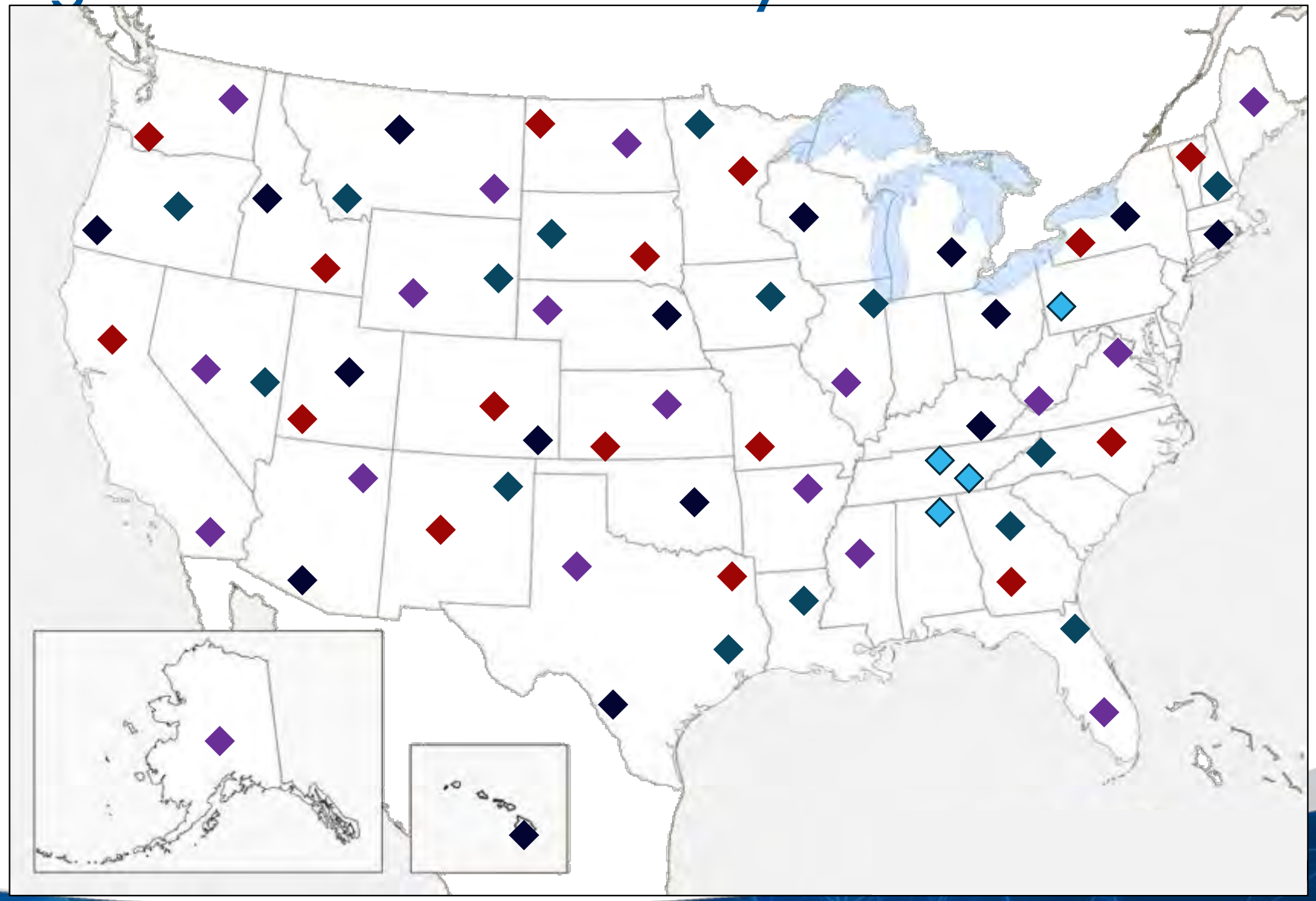


Cultivating Regional Innovation Ecosystems

- Point examples of regional innovation ecosystems today

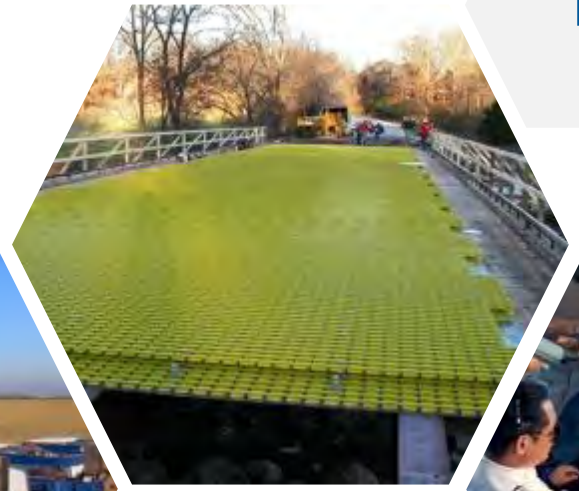
Cultivating Regional Innovation Ecosystems

- Point examples of regional innovation ecosystems today
- Creating opportunities for every community, state



I-CORPS™

SBIR/STTR

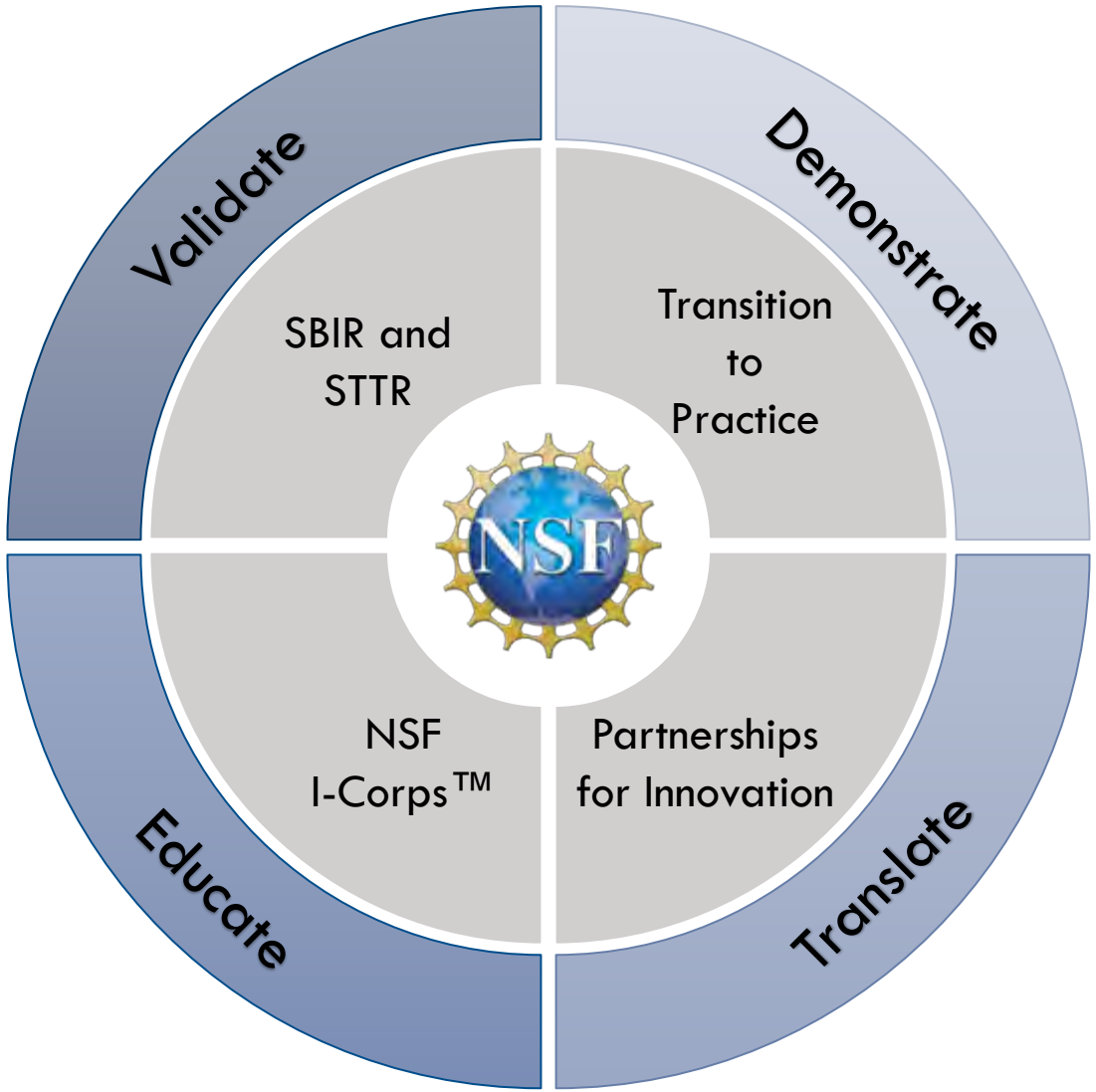


PFI

Convergence Accelerator

GOALI, INTERN

NSF's Lab-to-Market Platform



NSF IS READY, AGILE AND ADAPTABLE.

NSF WILL STRENGTHEN AT SPEED AND SCALE.

NSF IS THE PLACE.
THE TIME IS NOW.