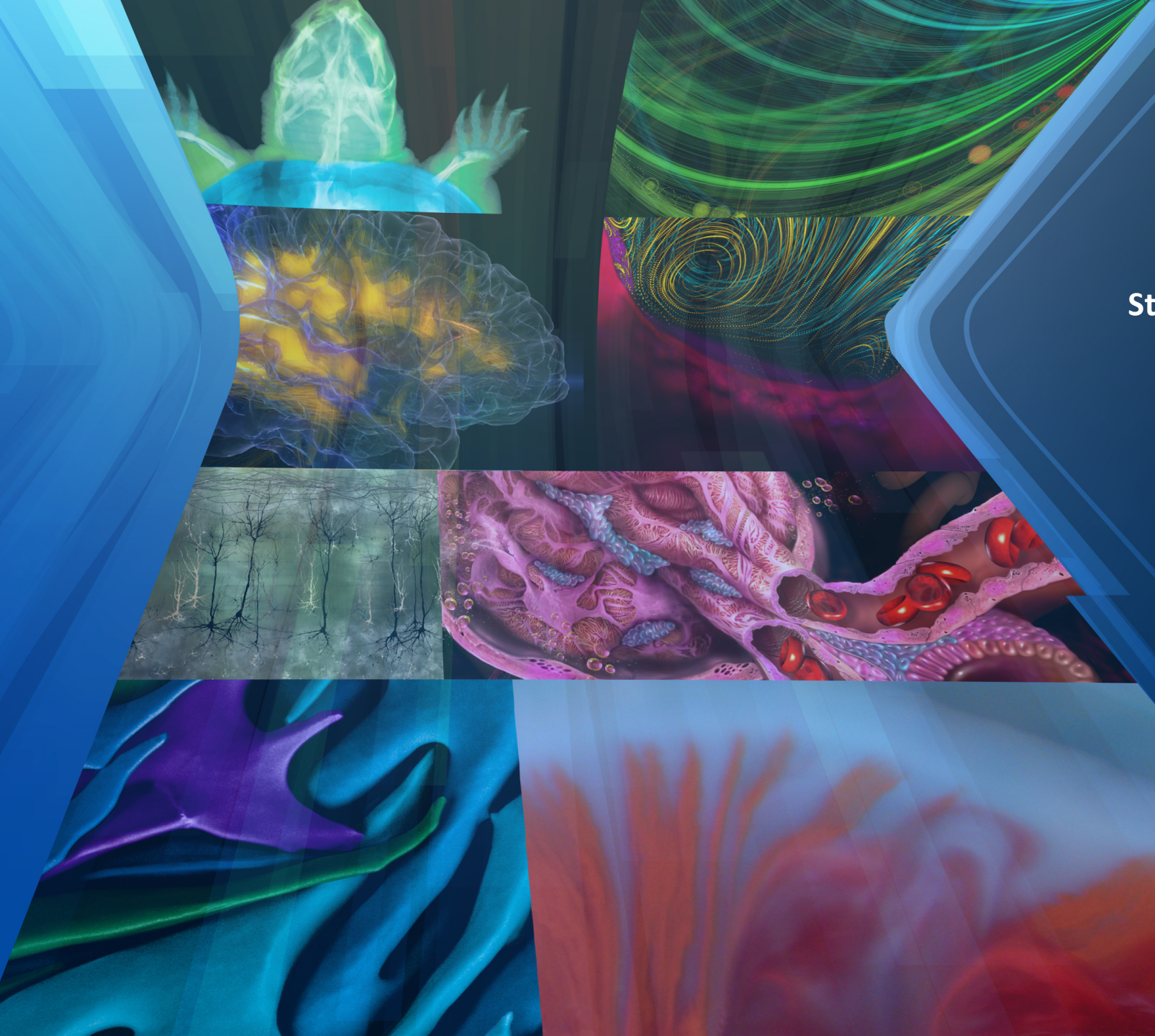


Strategic Role of the Federal Government in Supporting the University Innovation Ecosystem

May 23, 2019

Chinonye Nnakwe Whitley, PhD
Program Officer
EPSCoR Program
National Science Foundation

Objectives

- NSF By The Numbers
- NSF EPSCoR
- NSF Convergence Accelerator
- Opportunities within the Division of Industrial Innovation and Partnerships (IIP)
- Useful NSF Resources

Mission of the NSF

In 1950, Congress created the NSF “To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...”

Source: NSF Act of 1950, Public Law 81-507

NSF by the Numbers

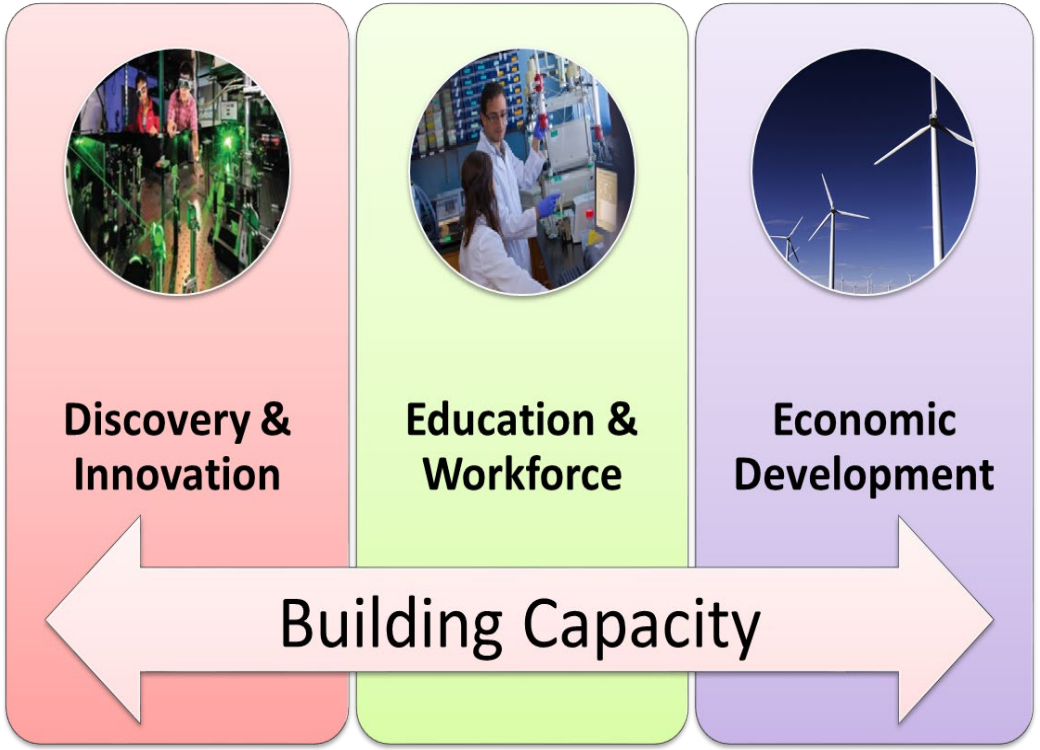
FY18 Appropriation does not include mandatory accounts, and the numbers shown are based on FY18 Performance and Financial Highlights

NSF Established Program to Stimulate Competitive Research (EPSCoR)

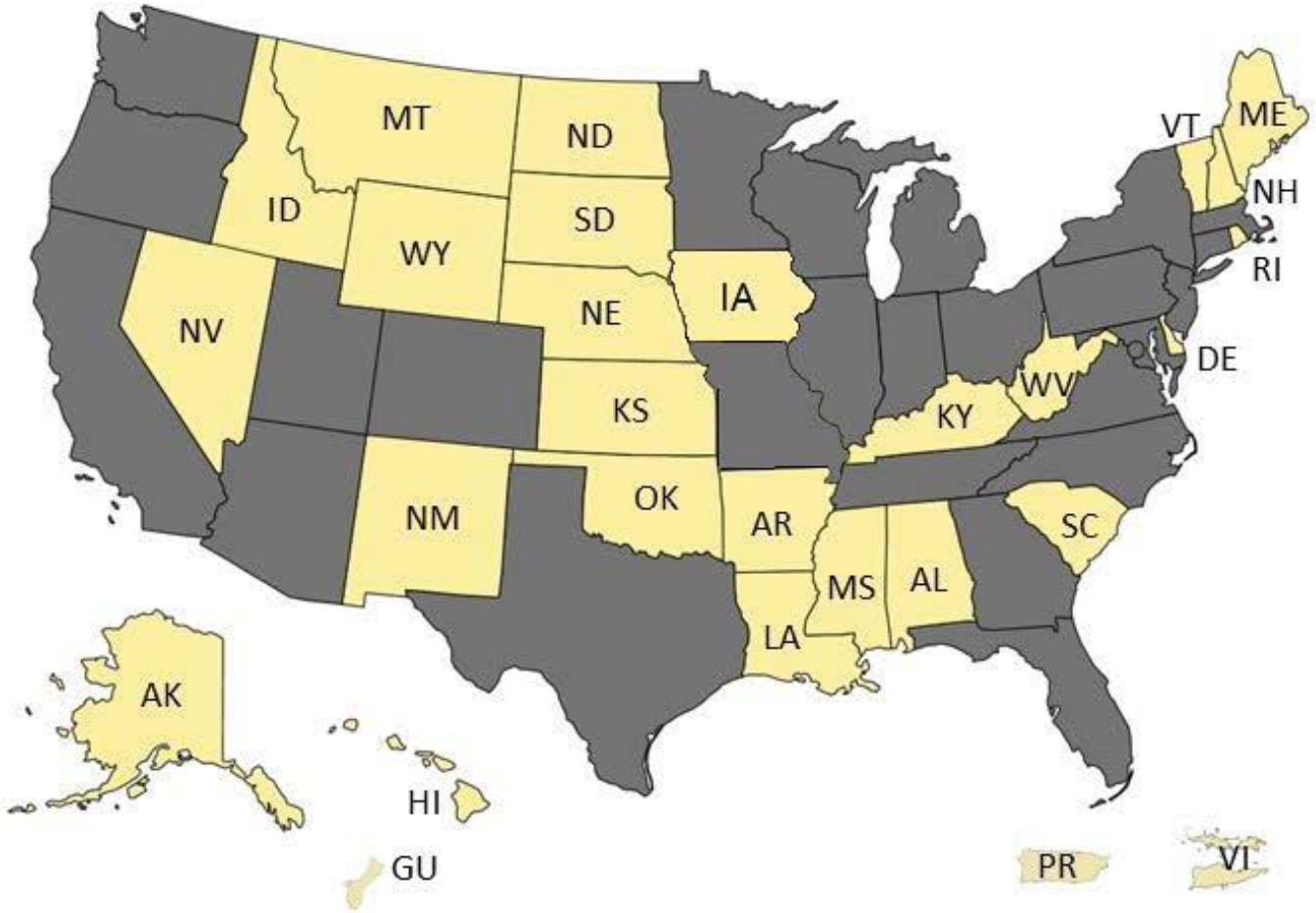
Program Mission: Enhance research capacity and competitiveness by strengthening STEM capacity and capability

Goals:

- Catalyze research capability across and among jurisdictions
- Establish STEM professional development pathways
- Broaden participation of diverse groups and institutions in STEM
- Effect engagement in STEM at national and global levels
- Impact jurisdictional economic development



FY19 EPSCoR Eligibility



States

AL Alabama
AK Alaska
AR Arkansas
DE Delaware
HI Hawaii
IA Iowa
ID Idaho
KS Kansas
KY Kentucky
LA Louisiana
ME Maine
MS Mississippi
MT Montana
NE Nebraska
NH New Hampshire
NM New Mexico
ND North Dakota
NV Nevada
OK Oklahoma
RI Rhode Island
SC South Carolina
SD South Dakota
VT Vermont
WV West Virginia
WY Wyoming

Other

GU Guam
PR Puerto Rico
VI U.S. Virgin Islands

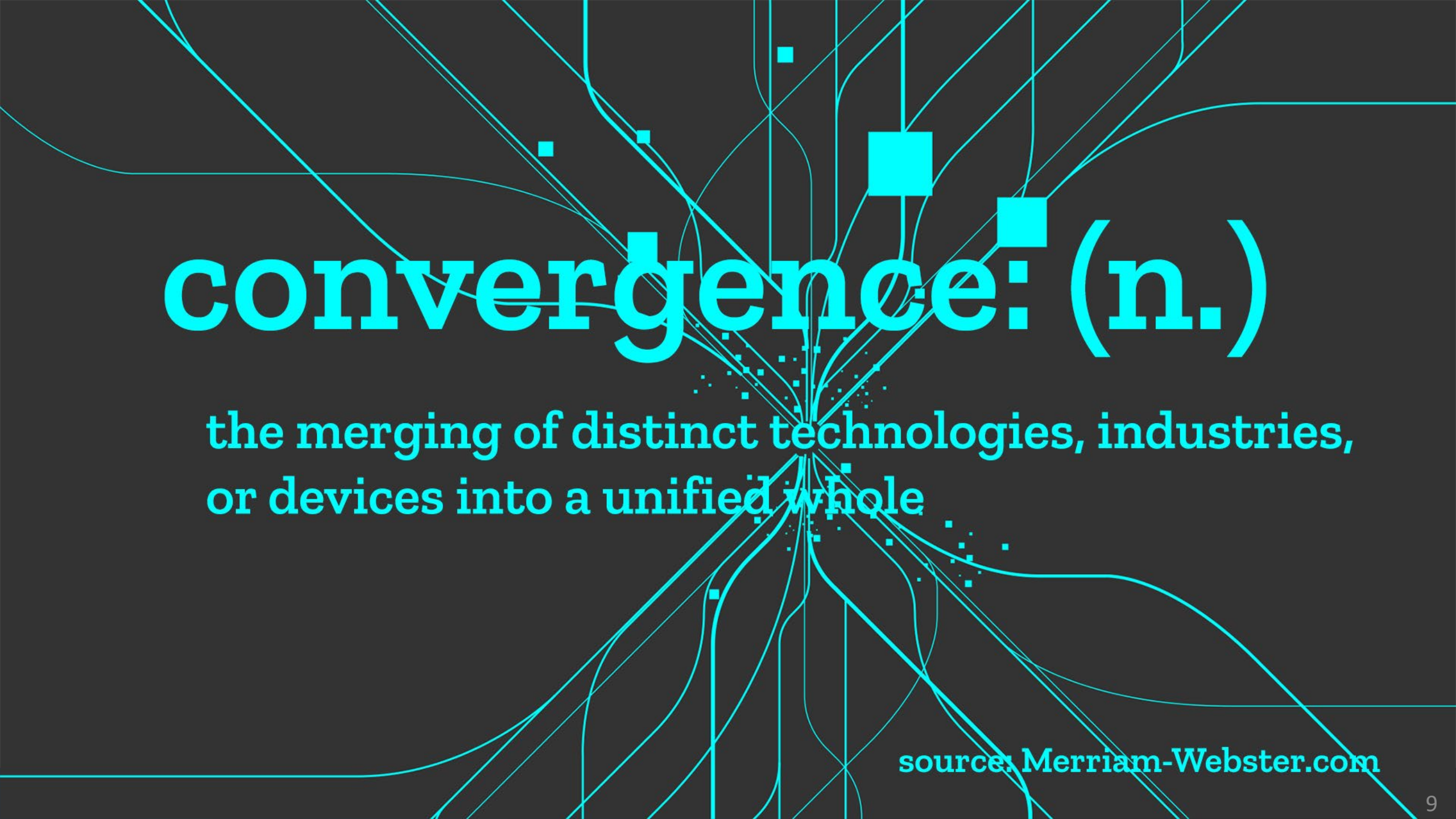
States, Commonwealths, and Territories that receive ≤ 0.75% of NSF research support funding averaged over most recent 3 years

EPSCoR Investment Strategies

- Building Research, Education, and STEM Workforce Capacity
  - *Research Infrastructure Improvement (RII) Programs*
    - Supports physical, human, and cyber infrastructure at academic institutions and builds research capacity and competitiveness in EPSCoR jurisdictions
- NSF-wide engagement
  - *Co-Funding with NSF Directorates and Offices*
- Collaboration between NSF and EPSCoR Community
  - *Outreach Activities and Workshops*

Research Infrastructure Improvement (RII)

- ***RII Track-1*:** Proposals from eligible jurisdictions submitted by a designee of the jurisdiction's governing committee;
  - up to $20M for up to 5 years.
- ***RII Track-2*:** Focused EPSCoR Collaborations focusing on areas aligned with NSF priorities;
  - up to $1M (or 1.5M, if more than 2 juris in consortia) per year for up to 4 years.
- ***RII Track-3***: Building Diverse Communities – Pilot in FY13; 10 awards; prelude to NSF INCLUDES
- ***RII Track-4*:** EPSCoR Research Fellows; supports collaborative research visits by non-tenured investigators from EPSCoR Institutions to private, governmental, or academic institutions in the U.S.
  - up to $300 K for up to 6 months of visit spread over 2 years.


convergence: (n.)
the merging of distinct technologies, industries,
or devices into a unified whole
source: Merriam-Webster.com

NSF Convergence Accelerator

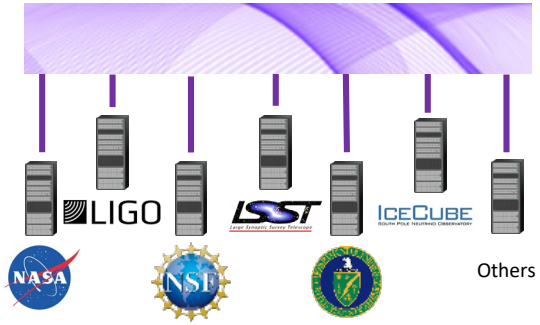
- WHAT: A new effort at NSF to **accelerate use-inspired convergent research** directed at solutions for important national challenges.
- WHY: Leverage science and engineering research across all fields supported by NSF to produce **outcomes** in an accelerated timeframe, with streamlined operations facilitating nimble support for innovative results
- HOW: Engages **multidisciplinary teams**, including **academic and non-academic partners** to conduct work in 2 phases:
  - Pilot Phase I: 9 mo. *awards up to $1 million will be made in Sept. 2019*
  - Pilot Phase II: 2 yr. *awards up to $5 million will be made in ~May 2020*

C-Accel@nsf.gov

NSF Convergence Accelerator

INITIAL TRACKS

Open Knowledge Network



Enhancing scientific data discovery and use

AI & Future Jobs

Connecting, retraining and reskilling for jobs using AI

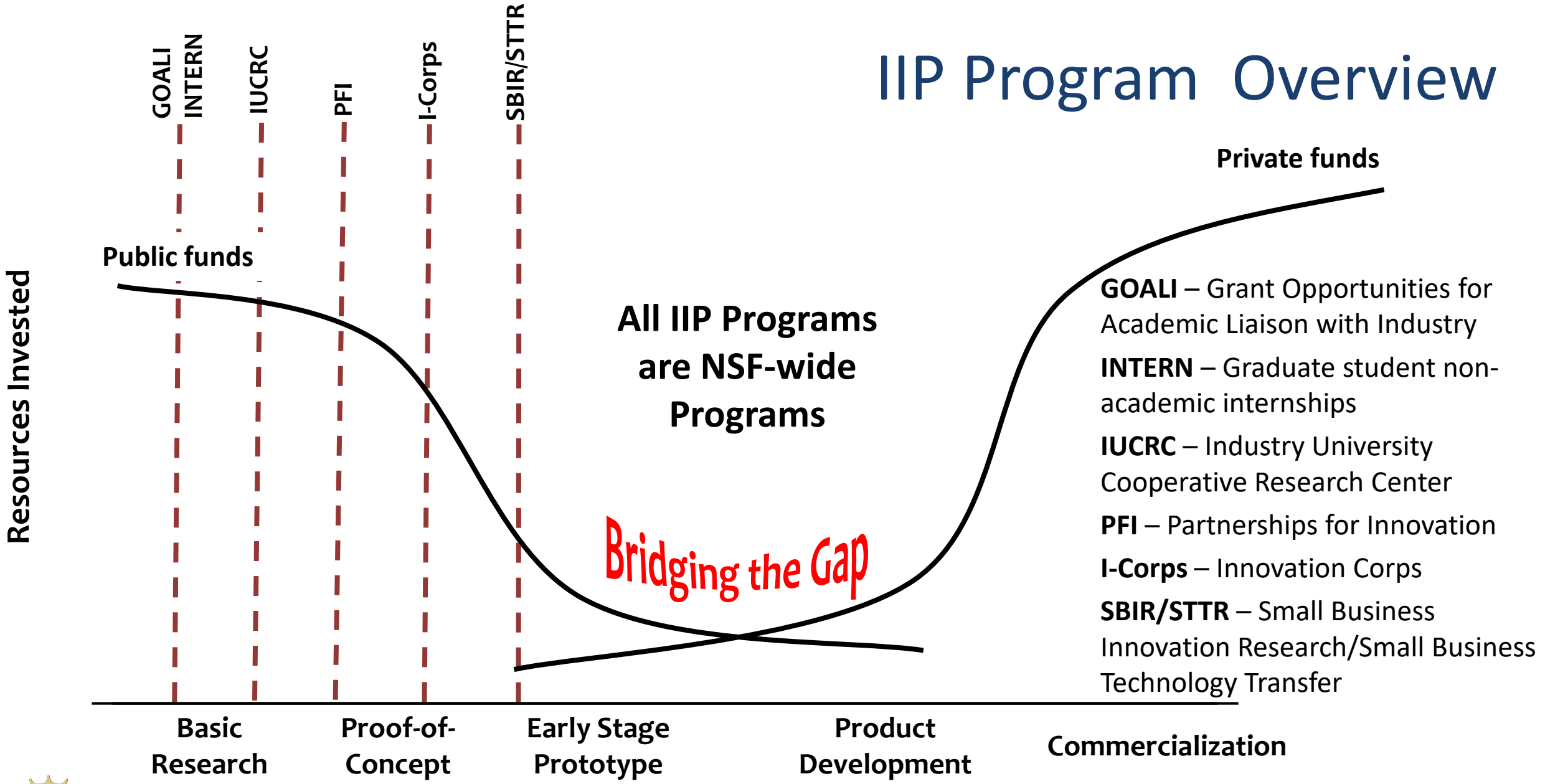
National Talent Ecosystem

Building talent in a changing workplace

Request for Information – Future Topics

- DCL 19-065 https://www.nsf.gov/pubs/2019/nsf19065/nsf19065.jsp
- Suggest topics **ready to accelerate** to practical solutions
  - Non-academic stakeholders interested and ready to engage
- Effort requires interdisciplinary, **convergent approach**
- Topics of national importance – significant scientific and **societal impact**
- Broad enough to support a set of related research teams working together as a cohort
- Complete **online questionnaire by **June 24****
- **Workshop proposals welcome** to refine topics!
  - C-Accel@nsf.gov
  - **Submit by June 24**, budget <$100K for FY19 funding consideration

IIP Program Overview



GOALI – Grant Opportunities for Academic Liaison with Industry

INTERN – Graduate student non-academic internships

IUCRC – Industry University Cooperative Research Center

PFI – Partnerships for Innovation

I-Corps – Innovation Corps

SBIR/STTR – Small Business Innovation Research/Small Business Technology Transfer

GOALI

NSF Totals
FY 2014 – $26.44 M
FY 2015 – $18.78 M
FY 2016 – $19.78 M
FY 2017 – $20.00 M

- Established at NSF in 1996.
- Approximately 80 grants funded each year.
- Focuses on basic research with one or more features:
  - Collaborative industry-university research.
  - University faculty/students in an industrial research environment.
  - Industry researchers in a university research environment.
- Requires an industrial partner (industry co-PI).
- Any program at NSF can use the GOALI funding mechanism.

INTERN

- Non-academic graduate research internships.
- Host organizations may include:
  - Industry laboratories or research and development groups.
  - Start-ups or small businesses.
  - Government agencies and National Laboratories.
  - Policy think-tanks.
  - Non-profit organizations.
- Supplemental funding to any active NSF research grant.
- Up to six months per internship for up to $55,000.
- Graduate student eligibility:
  - Must be supported on an active NSF award.
  - Must have completed at least one year in their graduate program.
  - International students are eligible.

58.6% of all engineering doctorate recipients had a definite job commitment at graduation anywhere in the world (including post-docs).

72.9% were industry; 14.1% academe

All Disciplines

Life Sciences	59.5%
Physical/Earth Sciences	62.0%
Math/Computer Sciences	67.4%
Psychology/Social Sciences	67.4%
Engineering	58.6%
Education	64.8%
Humanities/Arts	52.1%
All Fields	61.8%

Source: National Center for Science and Engineering Statistics (NCSES), Doctoral Survey, 2018

IUCRC

NSF Totals
FY 2014 – $19.41 M
FY 2015 – $20.00 M
FY 2016 – $20.50 M
FY 2017 – $20.50 M

- Focused on developing long-term partnerships.
  - Between industry, university, and government.
  - Cooperatively defined and shared pre-competitive research.
- 76 Active Centers.
- 211 research sites.
- 37 states with at least one IUCRC site.
- 6 international sites.
- 876 unique members
- 1,586 center-trained students hired by members
- 42:1 leveraging of each member's funds.

- **Especially interested in IUCRCs that focus on the "Big Ideas" and related topics.**
- **Proposed IUCRCs can bypass the planning grant if they already have strong industry support.**

PFI

PFI Totals (TT+RP)
FY 2014 – $20.48 M
FY 2015 – $21.50 M
FY 2016 – $21.50 M
FY 2017 -- $22.00 M

- Program goals include:
  - Accelerate translation of research results to societal impact.
  - Promote a sustainable academia-based innovation ecosystem.
  - Train faculty and students in technological innovation.
  - Engage women and other underrepresented groups in innovation.
- PFI-RP grants are up to $750,000 over 3 years.
  - Focused on multidisciplinary teams.
  - Requires an industry partner.
- PFI-TT grants are up to $200,000 over 18 months.
  - Applied research.
  - Proof-of-concept demonstrations.

PFI-RP – Partnerships for Innovation-Research Partnerships

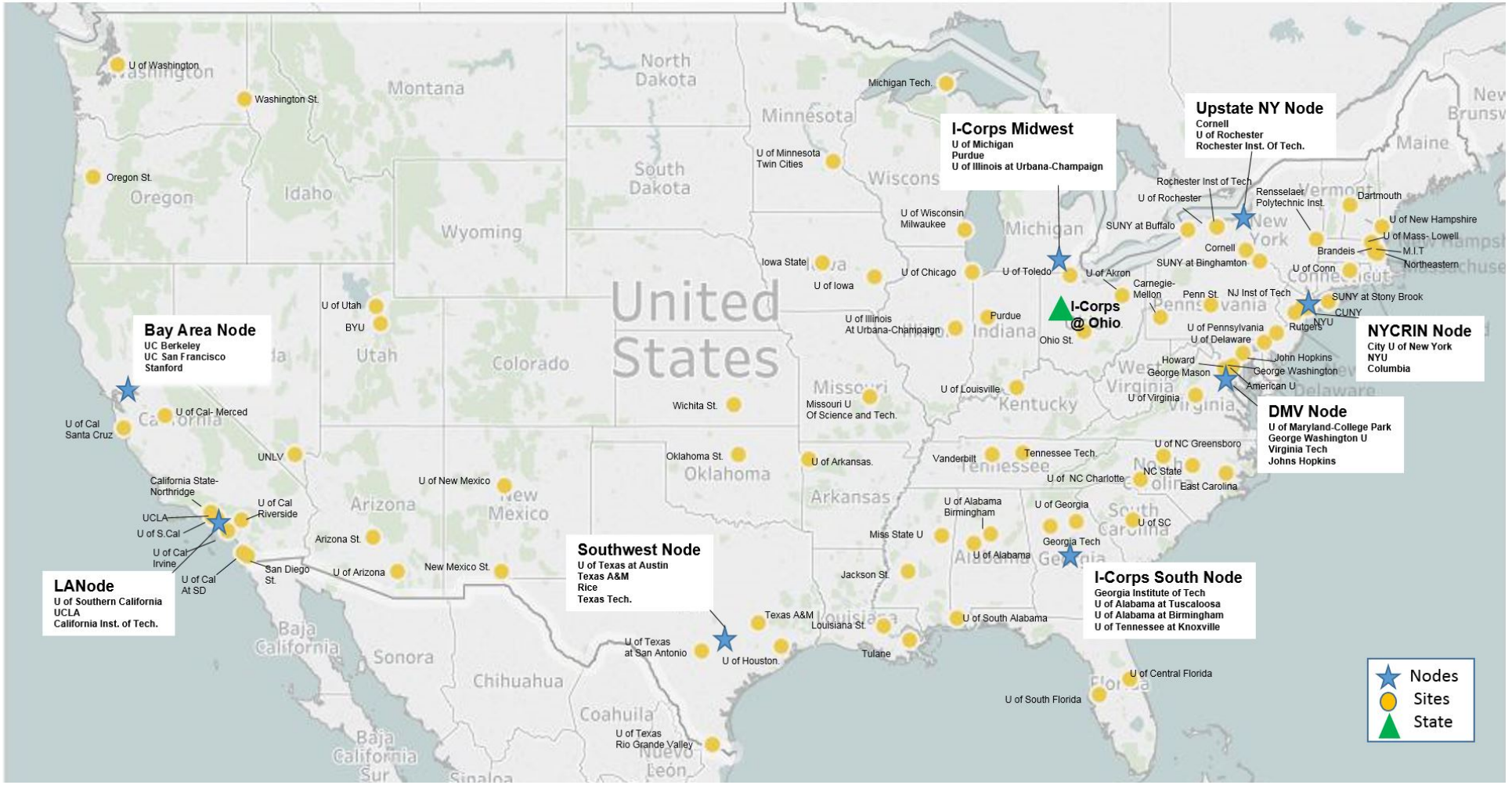
PFI-TT – Partnerships for Innovation-Technology Translation

I-Corps™

NSF Totals
FY 2014 – $20.48 M
FY 2015 – $26.23 M
FY 2016 – $29.74 M
FY 2017 – $30.00 M

- Designed to foster entrepreneurship.
- Program goals include:
  - Spur translation of fundamental research to the market place.
  - Encourage collaboration between academic and industry.
  - Train NSF-funded faculty, students, and other researchers in innovation and entrepreneurship skills.
- Distinct components of I-Corps™ program.
  - Teams – Technical Lead (TL), Entrepreneurial Lead (EL), Mentor (M).
  - Nodes – Hubs for education, infrastructure, and research that engage scientists and engineers.
  - Sites – Academic institutions that catalyze the engagement of local teams in technology transition.
- Results to date.
  - 9 Nodes (28 universities) and 86 Sites (87 universities) form National Innovation Network (NIN)
  - 1,223 Teams trained
  - 583 startups created
  - 9 MOUs with other Federal agencies

I-Corps™ Awardees in EPSCoR Jurisdictions



- 23 or 26 EPSCoR Jurisdictions have I-Corps™ Sites
- University of Alaska, Fairbanks and University of Puerto Rico are also awardees!

SBIR-STTR

NSF Totals
FY 2014 – $159.99 M
FY 2015 – $177.11 M
FY 2016 – $188.56 M
FY 2017 – $198.34 M

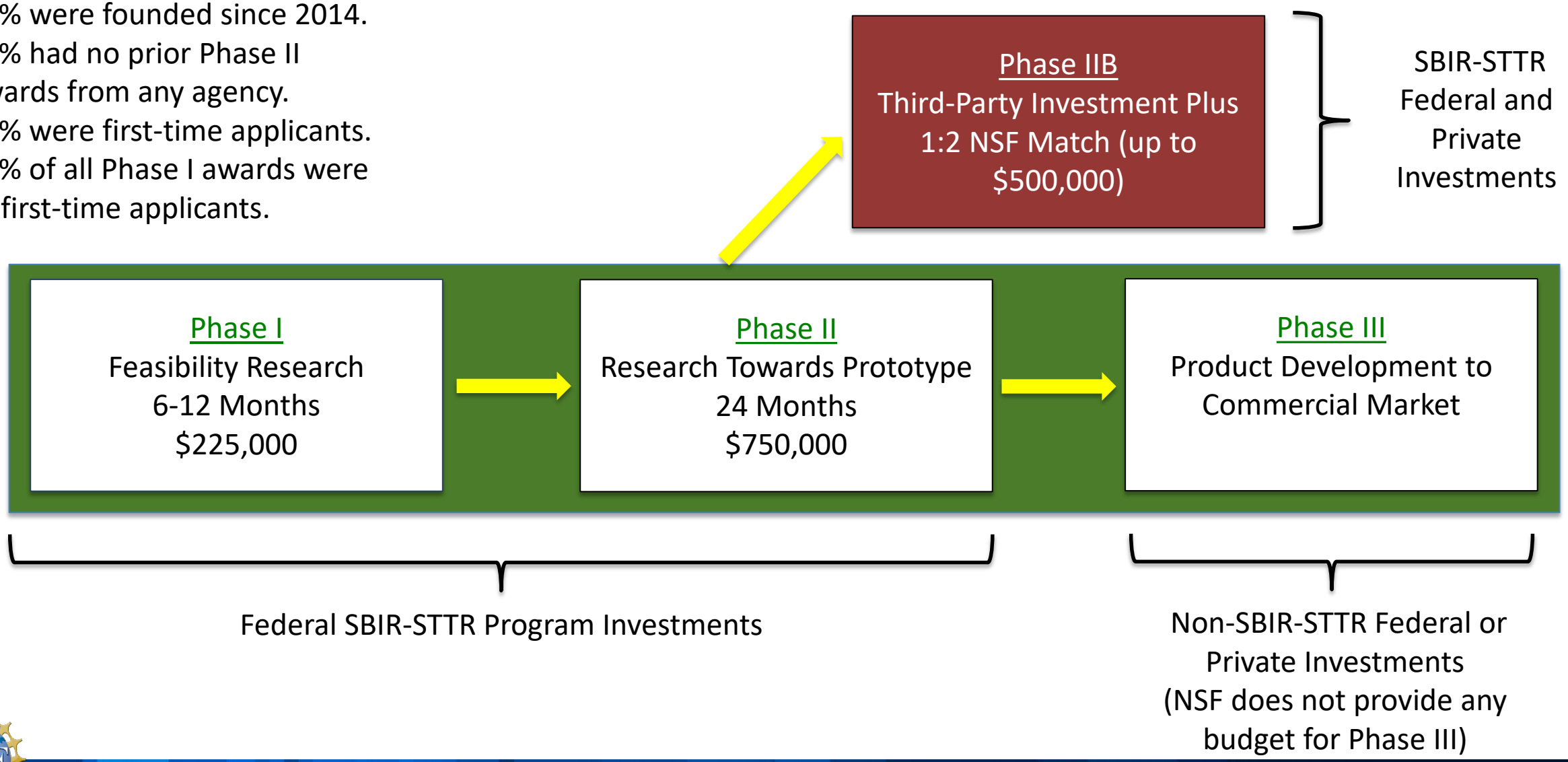
- SBIR started at NSF in 1976 (other agencies in 1982).
  - 11 federal agencies have SBIR programs.
  - Budget is 3.2% of agency's extramural research and development budget.
- STTR added in 1992.
  - 5 federal agencies have STTR programs.
  - Budget is 0.45% of extramural research and development budget.
- Program Goals
  - Stimulate technological innovation.
  - Increase commercialization of innovations derived from Federal research.
  - Meet federal research and development needs.
  - Foster and encourage participation in innovation by disadvantaged persons.
  - Foster technology transfer from research institutions.

SBIR – Small Business Innovation Research
STTR – Small Business Technology Transfer

Recent Highlights

- 85% of awards to companies with fewer than 5 employees.
- 72% were founded since 2014.
- 91% had no prior Phase II awards from any agency.
- 54% were first-time applicants.
- 62% of all Phase I awards were to first-time applicants.

NSF SBIR-STTR Model



Accelerating The Exchange Between Lab And Market

- **NSF created the Small Business Innovation Research program** in 1977**,** which has expanded across government and spends approximately **$3 billion annually** on research and development.
- NSF established the **Small Business Technology Transfer Program** in 1992 to encourage the translation of research from lab to marketplace; through small business and technology transfer programs, the federal government sets aside **$2.5 billion annually** and produces about **10 patents per day.**
- In FY 2018, NSF awarded more than **$200 million** in R&D funding through its small business programs.
- Each year, NSF funds about **400 companies** across nearly all technology and market sectors.
- NSF established **Innovation Corps, or I-Corps™**, which offers entrepreneurship training to scientists and engineers; the program has resulted in **645 startup companies.**

Source: National Science Foundation | **FACT SHEET** **https://www.nsf.gov/news/factsheets/bythenumbers.pdf**

How to Engage

- Stay abreast of NSF funding priorities and opportunities;
- Understand the program, the **PAPPG**, opportunities for research, education, outreach, and collaboration in your institution/jurisdiction/network
- Search recent awards, Speak to successful PIs, Communicate with NSF program officers and jurisdictional EPSCoR state offices, as needed
- Participate in grant-writing workshops, NSF days, NSF Grant Conferences
- APPLY!!! and be responsive to the solicitation and review criteria
- Revise and **resubmit**; Manage awards efficiently – follow guidelines
- Serve as a reviewer
- Serve as a NSF Rotating Program Officer https://www.nsf.gov/careers/

Some Useful NSF Resources

- Find Funding and Search Awards: http://www.nsf.gov
  - Includes Directorate/Divisions/Program; cross-cutting, students, postdocs, and Int'l Opportunities
- Proposal and Award Policies and Procedures Guide (PAPPG): https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg
  - The FY19 guide is effective for proposals submitted on or after Feb. 25, 2019
- Merit Review Process Video: http://www.nsf.gov/news/mmg/mmg_disp.jsp?med_id=76467
- NSF Outreach – Grants Conference Presentations: https://nsf.gov/bfa/dias/policy/outreach.jsp#present
- NSF Days – Presentation Slides: https://www.nsf.gov/about/congress/nsfdays/index.jsp
- NSF Toolkit: https://nsf.gov/about/congress/toolkit.jsp

Stay in touch!

Ask early and often!

Chinonye Nnakwe Whitley, PhD
National Science Foundation
cwhitley@nsf.gov

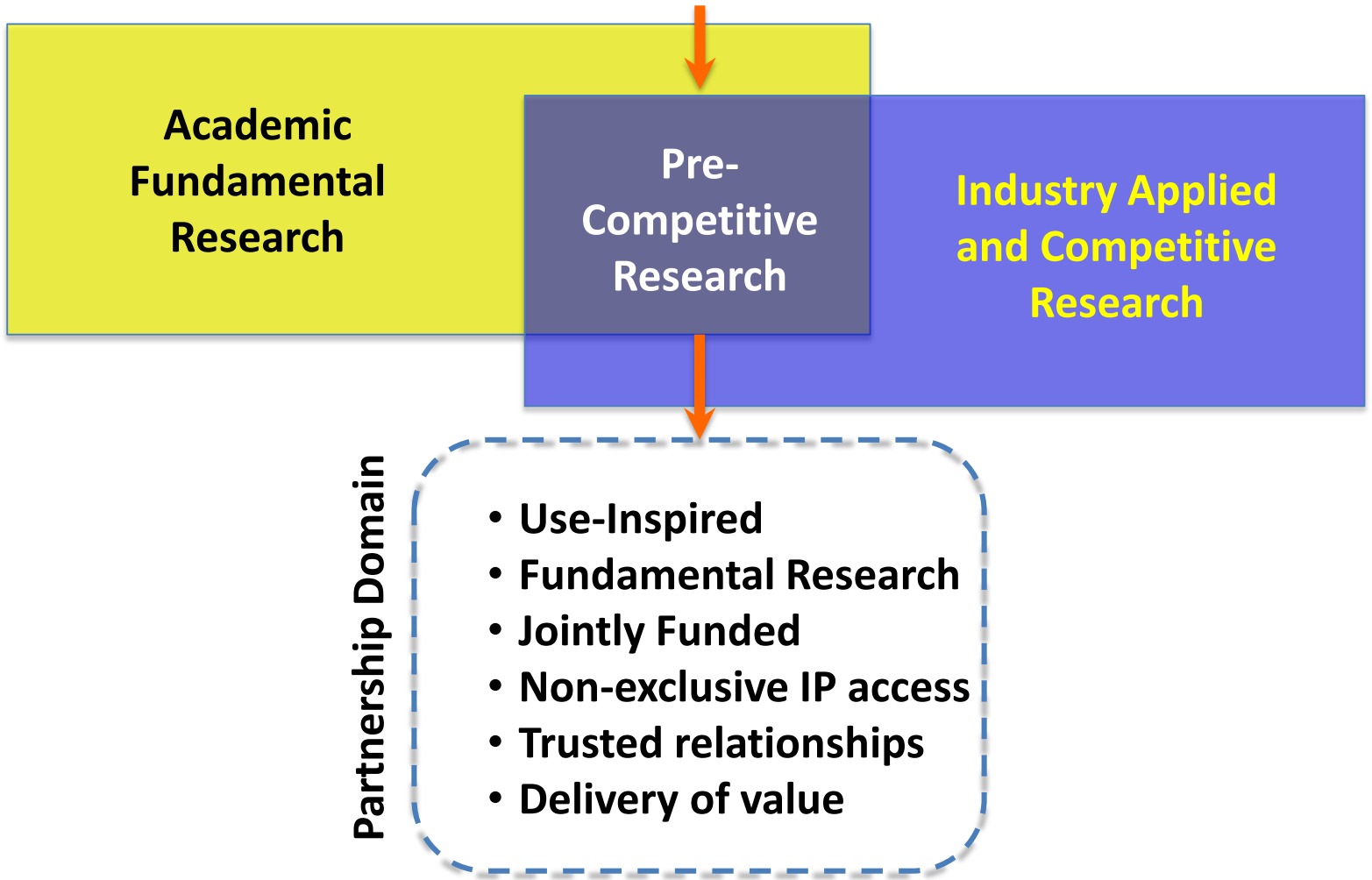
Thank you

Appendix

Opportunities with the Division of Industrial Innovation and Partnerships (IIP)

- **Pursue specific deeper research challenges collaboratively**
  - Grant Opportunities for Academic Liaison with Industry (**GOALI**) proposals
- **Shared cooperative research that is industry driven**
  - Industry-University Cooperative Research Centers (**IUCRC**) Program
- **Support innovative technology from NSF basic research**
  - Partnerships for Innovation (**PFI**) Program
- **Form/Partner with innovative startups**
  - I-Corps™ Entrepreneurial training
  - Small Business Innovation Research (**SBIR/STTR**) Program
- **For Graduate and Postdoctoral Educational Experiences**
  - Non-Academic Research Internships for Graduate Students (INTERN) Supplements
  - Small Business Postdoctoral Research Diversity Fellowship

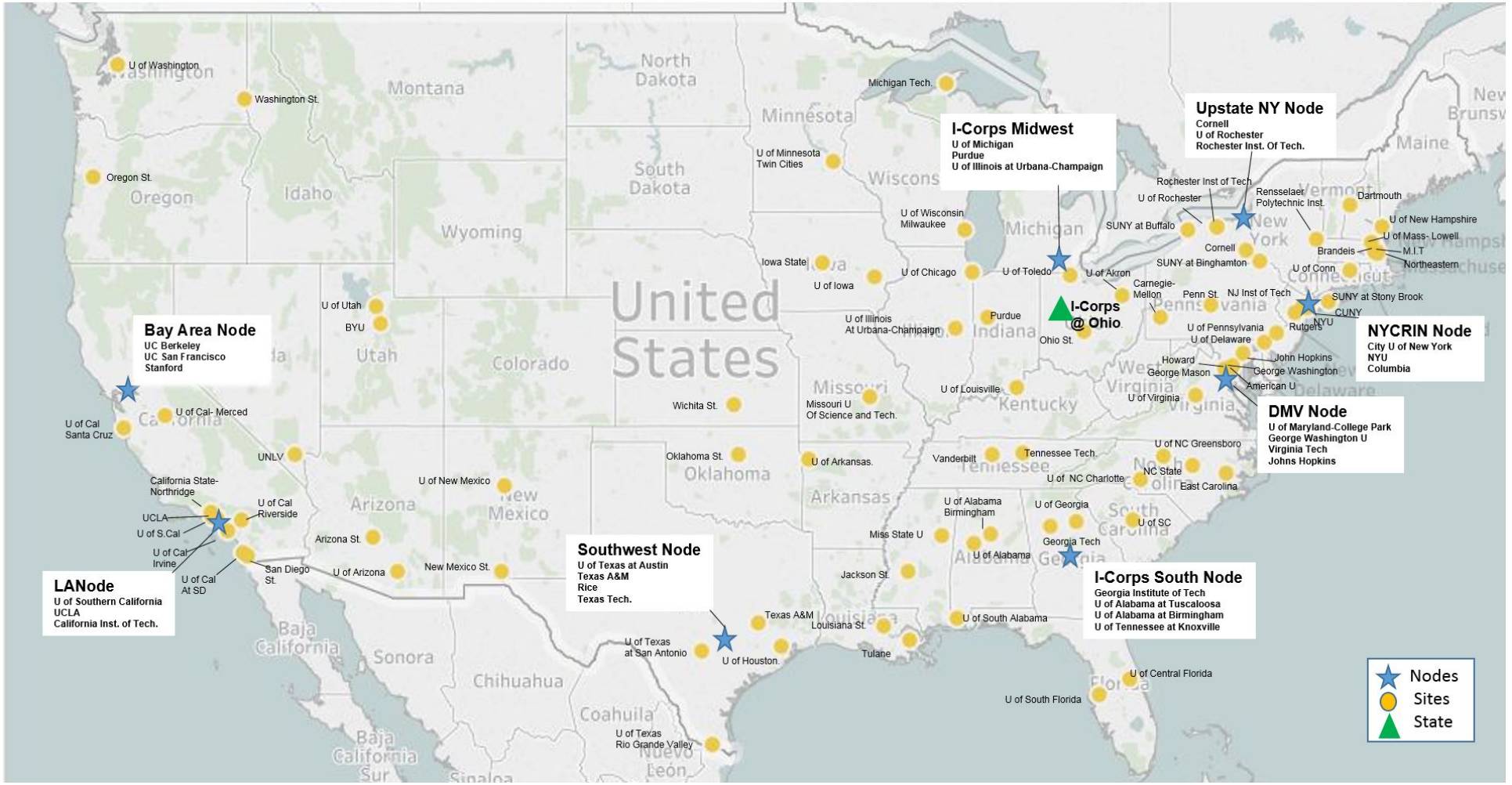
Partnership Model for IUCRCs



Active IUCRC Technology Areas

- Advanced Electronics and Photonics
- Advanced Manufacturing
- Advanced Materials
- Biotechnology
- Civil Infrastructure Systems
- Energy and Environment
- Health and Safety
- Information Communication & Computing
- System Design and Simulation

I-Corps™ Awardees in EPSCoR Jurisdictions



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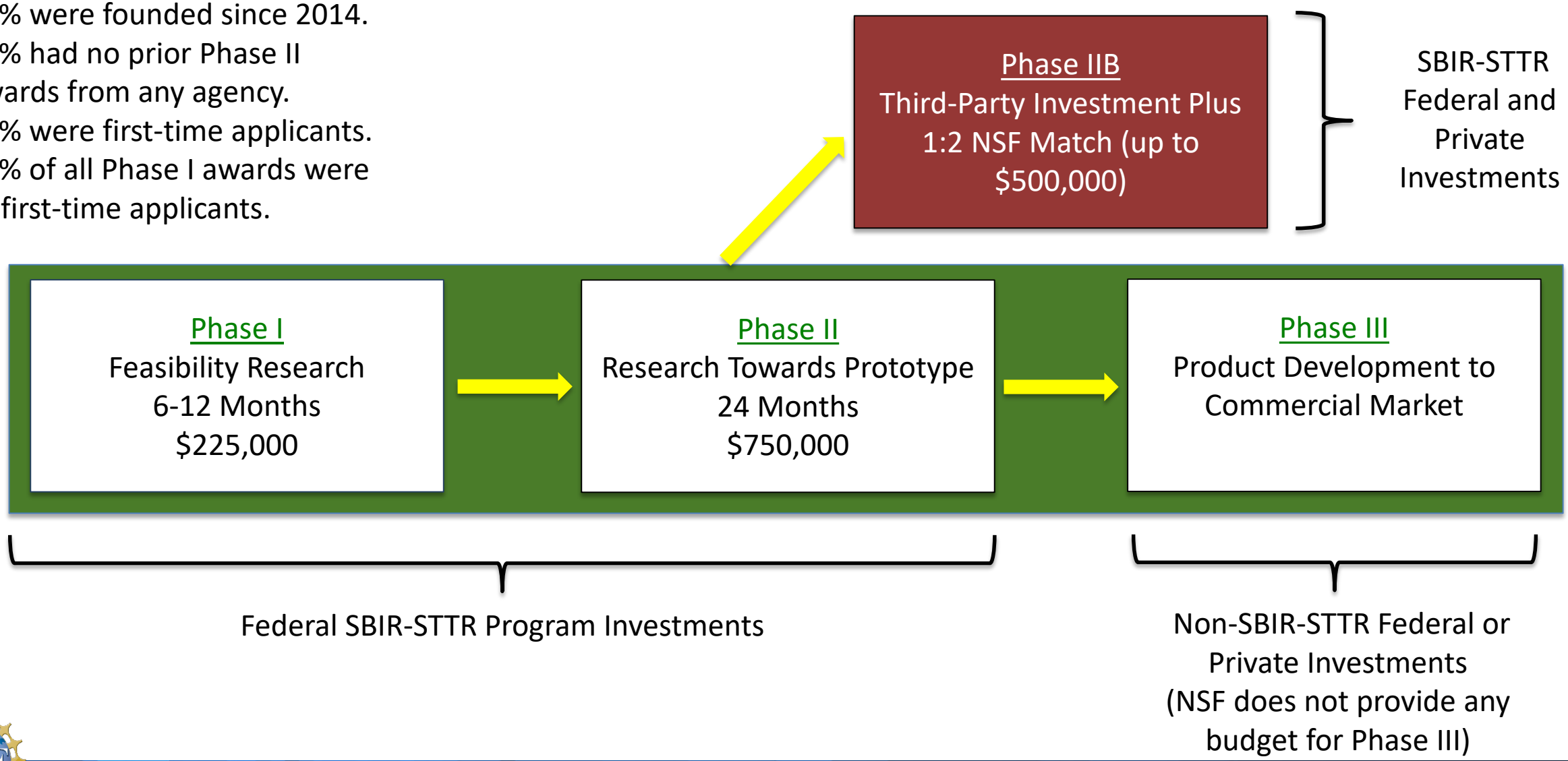

NSF EPSCoR Funding

Activity	FY14	FY15	FY16	FY17	FY18
RII	132.2	137.4	130.4	135.8	142.2
Co-funding	25.3	27.6	28.5	24.9	27.6
Outreach & Workshops	1.0	0.5	1.1	2.1	0.8
Total*	158.2	165.5	160.0	162.8	170.6

Convergence Accelerator Timeline

Research Concept Outlines	Proposals Due	Projects Start	Pitch Competition
Target April 15, 2019	June 3, 2019	Sep 2019	Mar 2020

Blue ribbon panel

Phase 1:
Team formation, research plan development

Phase 2:
Creating deliverables

Proposals Due	Projects Start	Deliverables
Feb 2020	May 2020	May 2022

2020 Accelerator Cohort: *new* projects

- Request for Information/Ideas released May 6,2019
- Responses due June 24
- Community workshops – Fall 2019
- 2020 Solicitation – Jan 2020