# TIP
**Technology, Innovation and Partnerships**

# Directorate for Technology, Innovation and Partnerships

UIDP Xurban 2022

Creates breakthrough technologies | Meets national needs | Empowers all

**TIP** **Technology, Innovation and Partnerships**

# UIDP Xurban 2022

Michael Reksulak

Program Director

Technology, Innovation and Partnerships Directorate

National Science Foundation

June 7, 2022

Creates breakthrough technologies | Meets national needs | Empowers all

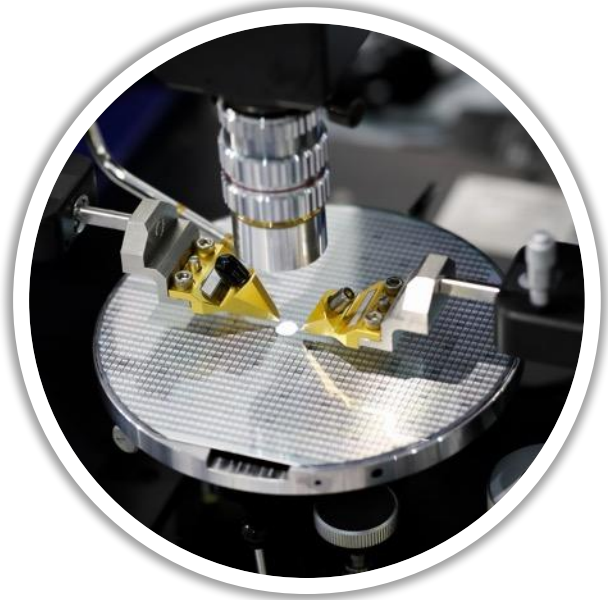# A Pivotal Moment for the Nation and Society



**Climate change**

**Equitable access to education, health care**

**Critical and resilient infrastructure**

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# A Changing Science and Engineering Enterprise Can Meet This Moment



**Pace of discovery accelerated by data, emerging technologies**



**Demand for societal and economic impact**



**Opportunity to leverage partnerships**

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# NSF: Where Discoveries Begin



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

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# A New "Horizontal": Strengthen, Scale Use-Inspired and Translational Research



Engineering

Computer & Engineering

Geosciences (including Polar Programs)

Social, Behavioral & Economic Sciences

Mathematical & Physical Sciences

Integrative Activities

International Science & Engineering

**DIRECTORATE FOR TECHNOLOGY, INNOVATION AND PARTNERSHIPS (TIP)**

**TIP** Technology, Innovation and Partnerships

# TIP Directorate

TIP harnesses the nation's vast and diverse talent pool to **advance critical** and **emerging technologies**, **address pressing societal** and **economic challenges**, and **accelerate** the **translation of research results** from lab to market and society. TIP **improves U.S. competitiveness, growing the U.S. economy** and **training a diverse workforce** for future, high-wage jobs.

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# TIP: Accelerating Research Toward Impact
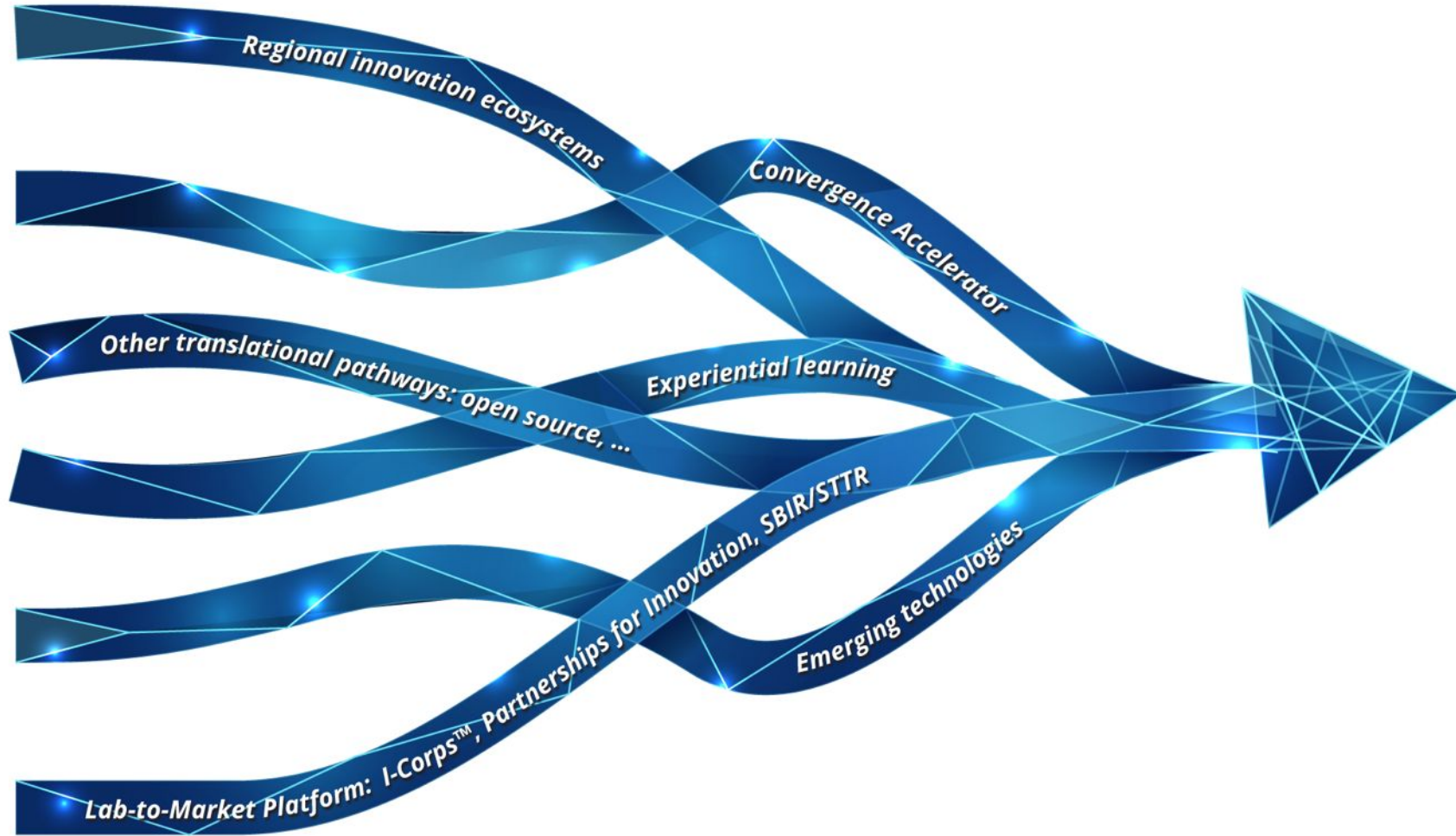
# TIP: Accelerating Research Toward Impact

TIP integrates with NSF's existing directorates and fosters partnerships—with government, industry, nonprofits, civil society and communities of practice—to leverage, energize and rapidly bring to society use-inspired research and innovation.

Collaborates with other TIP and NSF units to seed new programs that accelerate advances in key technologies areas.

| Fostering Innovation and Technology Ecosystems | Establishing Translation Pathways | Partnering to Engage the Nation's Diverse Talent |
|---|---|---|
| Nurtures regional and national innovation and technology ecosystems to support researchers and innovators to converge, develop and accelerate use-inspired research for societal impact. | Supports startups through a lab-to-market platform and establishes new pathways for translating research results for society. | Advances and deepens high-impact, public and private partnerships across all areas of science, engineering and education to cultivate innovation ecosystems, create technology solutions, and support future STEM leaders. |

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# TIP Programs

- America's Seed Fund powered by NSF (SBIR/STTR)
- Convergence Accelerator
- Innovation Corps (I-Corps™)
- Partnerships for Innovation (PFI)
- Pathways to Enable Open-Source Ecosystems (POSE)
- Regional Innovation Ecosystems (NSF Engines)

# Convergence Accelerator

*Accelerating convergent solutions for societal impact.*

| Goals | Characteristics | Proactively & Intentionally Managed |
|---|---|---|
| • Disrupt the usual way of NSF business through a new innovation model<br><br>• Expand and diversifies multidisciplinary teams and partnerships to include academia, industry, non-profits, government, and other sectors<br><br>• Deliver solutions that have a national societal impact | • Use-inspired research<br><br>• Clear goals, milestones, high-impact deliverables<br><br>• Leverages multidisciplinary teams<br><br>• Larger, national societal scale<br><br>• Requires diverse partnerships – industry, non-profits, academia<br><br>• Acceleration at speed and scale | • Teams and Cohorts—"Tracks"<br><br>• Cooperation and Competition<br><br>• Intensive education and mentorship—human-centered design thinking, team science, and customer discovery<br><br>• Mission-driven evaluation |

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# Program Structure

**IDEATION (DCL/RFI, WORKSHOPS):**

Selected by gathering input from the community. Identified topics must meet a societal need at scale, be built upon foundational research, and be suitable for a multidisciplinary, convergence research approach.

**PHASE 1 (PLANNING):**

Up to $750K over 9 months is provided to further develop the initial concept (building upon basic research), identify new team members/partners, participate in a hands-on innovation curriculum, and develop an initial/low-fidelity prototype.

**PHASE 2 (IMPLEMENTATION):**

Up to $5M over 24 months to develop solution prototypes and to build a sustainability model to continue impact beyond NSF support.

| IDEATION | PHASE 1 | PHASE 2 | SOCIETAL IMPACT |
|----------|---------|---------|-----------------|

Convergence Research Focus

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# Program Solicitation Evaluation/Review Criteria

NSF | NSF's Convergence Accelerator

*Convergence Accelerator: Submitting the "same old proposals" won't work!*

## INTELLECTUAL MERIT & BROADER IMPACTS:

**Intellectual Merit:**
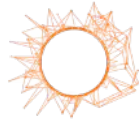Encompasses the potential to advance knowledge

**Broader Impacts:**
Encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes

| PROGRAM SPECIFIC CRITERIA: | |
|---|---|
| **Convergence:** | Multiple disciplines with a focus on social science aspects; think big—Experts from multiple institutions |
| **Cross-cutting Partnerships:** | Multiple organizations and sectors; not just academia; must include industry, non-profits, government, and other communities of practice American people in 3 years, (e.g., Prototypes); What impact the solution have a national and/or global scale? |
| **Broadening Participation:** | Describe activities that will be undertaken to increase the participation of underrepresented groups (e.g., expertise, partnerships, user groups, resource needs); Refer to the Broadening Participation Plan requirements |
| **Deliverables:** | What can teams deliver to the American people in 3 years, (e.g., Prototypes); What impact the solution have a national and/or global scale? |
| **Track Alignment:** | How can multiple teams work together to solve a national-scale complex challenge?<br>• Each track funds a set of diverse teams focusing on different aspects of a national-scale societal challenge<br>• Teams are uniquely positioned to ensure the highest societal impact |

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Visit: beta.nsf.gov/funding/initiatives/convergence-accelerator

# Convergence Accelerator Portfolio

| Track A | Track B | Track C | Track D | Track E | Track F |
|---------|---------|---------|---------|---------|---------|
| Open Knowledge Networks | AI and the Future of Work | Quantum Technology | AI-Innovation Data Sharing & Modeling | Networked Blue Economy | Trust & Authenticity in Communication Systems |

**2019 COHORT**
Phase 2

**2020 COHORT**
Phase 2

**2021 COHORT**
Phase 1

| Track G | Track H | Track I | Track J | Track K | Track L |
|---------|---------|---------|---------|---------|---------|
| Securely Operating Through 5G Infrastructure | Enhancing Opportunities for Persons with Disabilities | Sustainable Materials for Global Challenges | Food & Nutrition Security | Track Topic: TBD | Track Topic: TBD |

**2022 COHORT**

**FUTURE COHORT**

**NSF**

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# NSF CONVERGENCE ACCELERATOR
# EXPO 2022

Expo 2022 highlights the National Science Foundation Convergence Accelerator's portfolio. Attendees will have the opportunity to see novel solutions across multiple convergence research track topics that are focused on national-scale societal challenges.

## TRACK TOPICS

- Open Knowledge Networks
- AI & the Future of Work
- Quantum Technology
- AI-Driven Data Sharing & Modeling
- Networked Blue Economy
- Trust & Authenticity in Communication Systems

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## EXPO 2022 TAKEAWAYS

- **ENGAGE 45+ INNOVATIVE SOLUTIONS** focused on societal impact — A wide range of live presentations will be presented in each team's exhibition booth

- **EXPAND YOUR NETWORK** — Meet new people outside of your expertise, discipline, community, and sector

- **ACCELERATE SOLUTIONS INTO PRACTICE** — Support a funded team in accelerating their solution forward through new partnerships or investments

- **ENGAGE IN THE CONVERGENCE ACCELERATOR PROGRAM** — Learn about our unique differentiators

- **PARTICIPATE IN THE U.S. RESEARCH & INNOVATION ENTERPRISE** — Develop and deliver technologies and solutions through NSF's Directorate of Technology, Innovation and Partnership programs

## DETAILS
July 27 – 28, 2021 | 10 a.m. – 4 p.m. ET

## LOCATION
Expo 2022 is virtual.

## WHO SHOULD ATTEND
Expo 2022 is open to the public. Researchers, innovators, technology and business practitioners and media from academia, industry, government, nonprofit, and other communities are encouraged to attend.
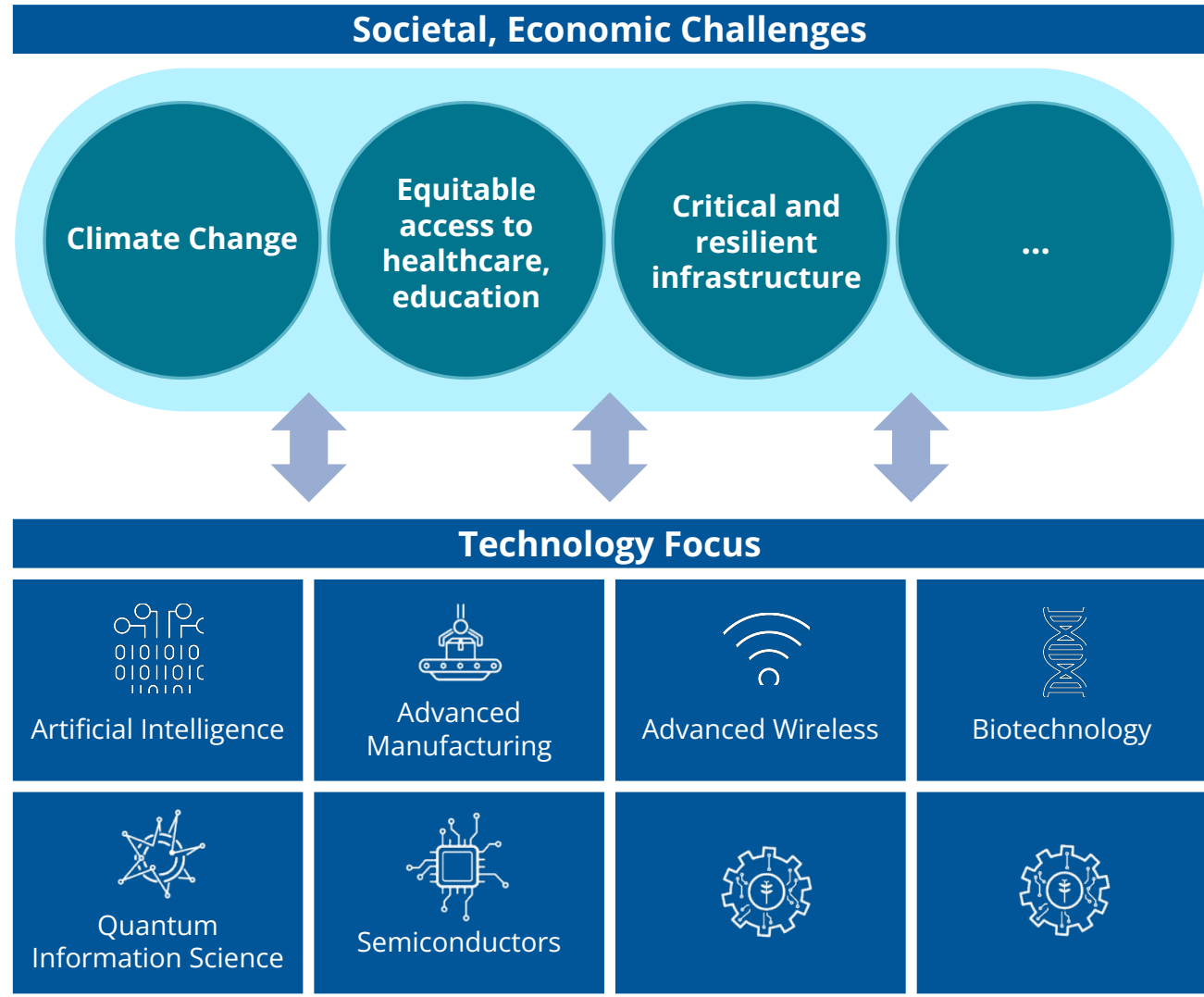
## REGISTRATION
nsf-ca-expo2022.vfairs.com

Registration is complimentary.

# NSF Regional Innovation Engines (NSF Engines)

- Cultivate new innovation and technology ecosystems at the scale of individual communities and/or regions throughout the U.S.

- Address major scientific and technological goals while ensuring solutions to societal challenges

- Balance technical and geographic innovation; incentivize partnerships; serve as hubs for NSF's broader portfolio

**Societal, Economic Challenges**

| Climate Change | Equitable access to healthcare, education | Critical and resilient infrastructure | ... |

**Technology Focus**

| Artificial Intelligence | Advanced Manufacturing | Advanced Wireless | Biotechnology |
| Quantum Information Science | Semiconductors | | |

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# NSF Engines: an intentionally different approach

- Scale ($10-20M/year x 10 years per RIE), with milestone requirements for continued funding

- Iterative co-design/co-creation through intentional engagement of broad, diverse stakeholders ("users")

- Focused success expectations:
  - Regional development
  - Individual and geographic diversity, including mentoring
  - Scaling and sustainability
  - Active participation and engagement
  - IP ownership extends to all contributing parties
  - Changing culture
  - Practitioner/entrepreneur development
  - Integrative/additive

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# NSF Engines

Point examples of local/regional innovation and technology ecosystems today

Creating opportunities for every community, state

- ◆ Focus Area 1
- ◆ Focus Area 2
- ◆ Focus Area 3
- ◆ Focus Area 4
- ◆ Focus Area 5



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![NSF logo] NSF's Regional Innovation Engines Program
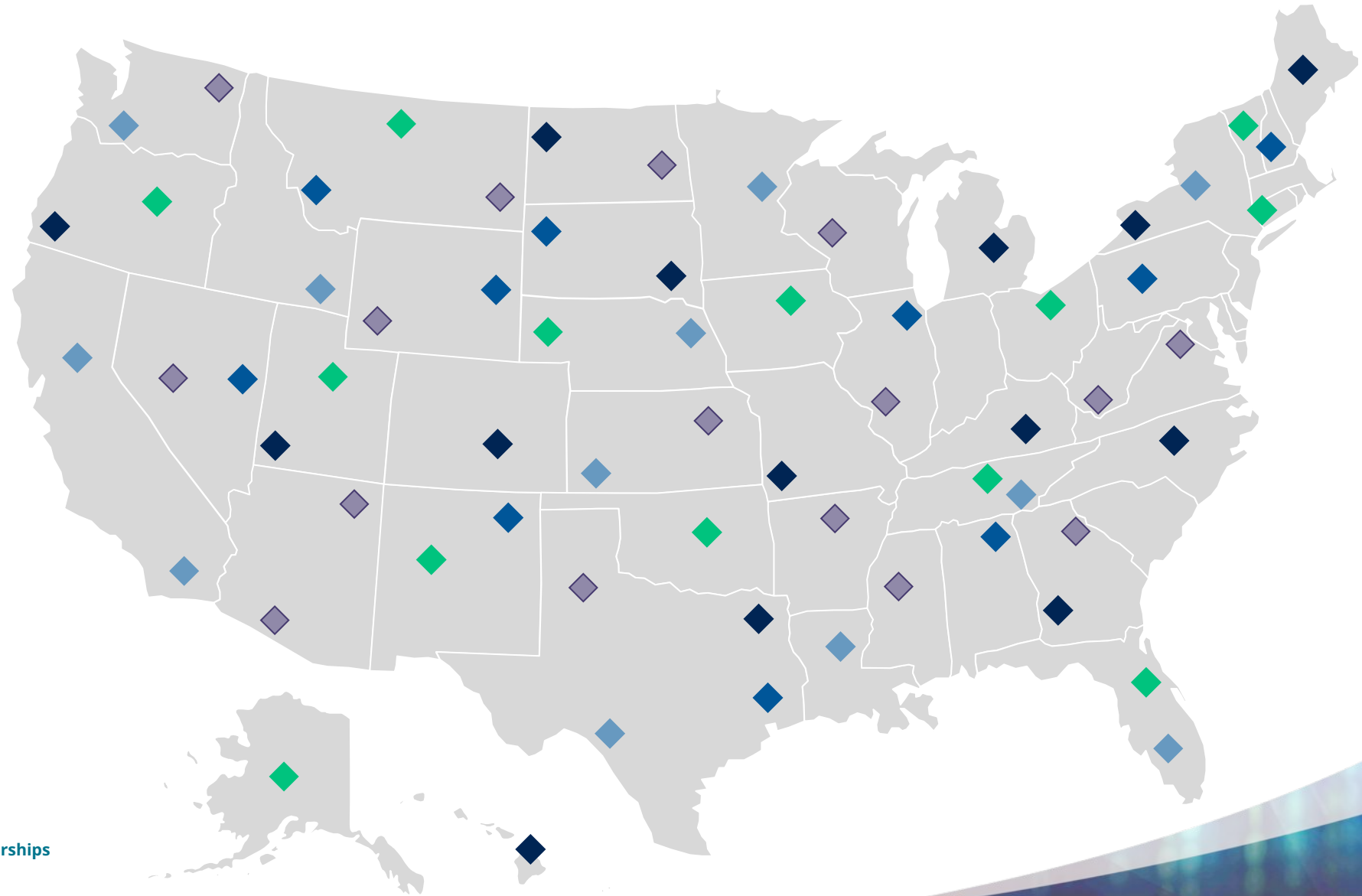
# CATALYZE AND FOSTER INNOVATION IN YOUR REGION

## Jumpstart your region's innovation ecosystem with up to $160 million of NSF funding over 10+ years.

The National Science Foundation's Regional Innovation Engines (NSF Engines) program is seeking regional teams rooted within industry, academia, government, nonprofits, civil society, and communities of practice to catalyze and foster innovation ecosystems across the U.S.

## ABOUT NSF ENGINES:

Through a bold, new initiative that cultivates use-inspired R&D, the NSF Engines program catalyzes and fosters innovation ecosystems across the U.S. to advance critical technologies; address societal challenges; promote and stimulate economic growth and job creation; and spur sustainable, regional innovation and nurture diverse talent.

The NSF Engines program uniquely harnesses the Nation's geography of expertise, unleashing a new era of innovation and competition for the U.S. Each NSF Engine can receive up to $160 million over 10+ years.

With this program, NSF is especially interested in invigorating regions of the country that have not fully participated in the technology boom of the past few decades.

## FUNDING OPPORTUNITY: BAA

**Who Can Apply:**
Innovators and ecosystem builders spanning industry, higher education, government, nonprofits, civil society, and communities of practice are encouraged to form regional coalitions and submit proposals.
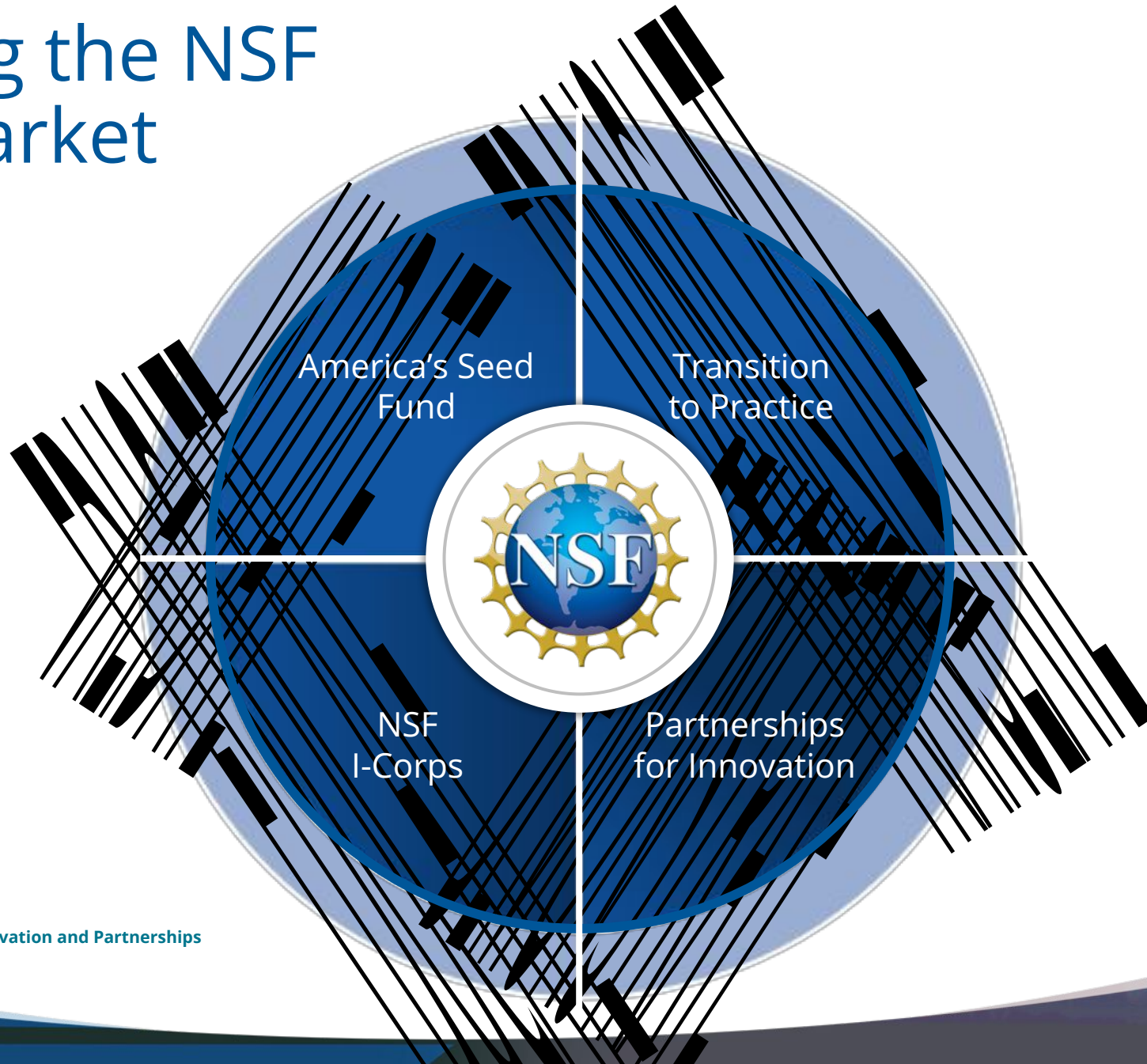
**Funding Opportunity:**
BAA: https://bit.ly/NSFEnginesBAA_2205

**BAA Key Deadlines:**
- Concept Outlines for Type-1 and Type-2: **June 30, 2022**
- Type-1 Letters of Intent: **August 31, 2022**
- Type-1 Full Proposals: **September 29, 2022**

*NSF anticipates accepting full proposals for Type-2 awards in FY23, on a date to be announced soon.*

# Enhancing the NSF Lab-to-Market Platform



America's Seed Fund

Transition to Practice

NSF I-Corps

Partnerships for Innovation

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# Innovation Corps (I-Corps™)

Spur translation of fundamental research to the marketplace.

Train NSF-funded faculty, students, and other researchers in innovation and entrepreneurship skills.

| Reach | |
|---|---|
| 9 | Nodes involving 28 universities |
| 92 | University Sites |
| 5 | Other Federal agencies teach I-Corps |
| 5 | I-Corps Hubs |

| Outputs | |
|---|---|
| 1,900+ | NSF Teams since 2012 |
| 1,000+ | Startups created |

I-Corps Hubs Solicitation:  https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505760

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# I-Corps isn't... and is....

## ✓ It is:

- $50K grants -- focus on **Product-Market Fit**
- Team-based
- Curriculum/process focus
- Mentors needed!

## ✗ It isn't:

- Selling
- Pitching
- Grant writing
- Business plans

www.nsf.gov/icorps

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# Partnerships for Innovation (PFI)

| | | | |
|---|---|---|---|
| A prototyping award for researchers with history of NSF funding | Does not require employment at a small business | Open to any technology area that is covered by NSF | Duration: 24-36 months Up to $500,000 |

**Visit
www.nsf.gov/PFI**

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# Pathways to Enable Open-Source Ecosystems (POSE)

Harnesses the power of open-source development for the creation of new technology solutions to challenges of national, societal, and economic importance

Outcomes:

- Ensure more secure open-source products
- Increased coordination of developer contributions
- A more focused route to impactful technologies

**Phase I** – 1 year
Enables scoping activities to inform the development of the open-source ecosystems and lead to a well-developed and sustainable plan.

Up to **$300,000**

**Phase II** – 2 years
Supports transition of an open-source research product into a sustainable open-source ecosystems.

Up to **$1,500,000**

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# America's Seed Fund (SBIR/STTR)

- Up to **$2M** in R&D funding to develop transformative, deep tech, high-impact technologies
- Transforms scientific discovery into products and services with commercial and societal benefit

**Project Pitch**
- Get started any time at seedfund.nsf.gov/apply

**Review Criteria for Full Proposals**
- Intellectual Merit
- Commercial Potential
- Broader Impacts

| Phase I: Feasibility Research 6-12 Months **Up to $275,000** | Phase II: Prototype Development 24 Months **Up to $1,000,000** | Phase IIB: Third-Party Investment Plus 1:2 NSF Match **(up to $500,000)** |
|---|---|---|

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# SBIR/STTR Award Funding* (FY 2020)

NSF | America's SEED FUND | SBIR.STTR

Funding Obligated*
## $221M

Awards
## $190M

Supplements
## $31M
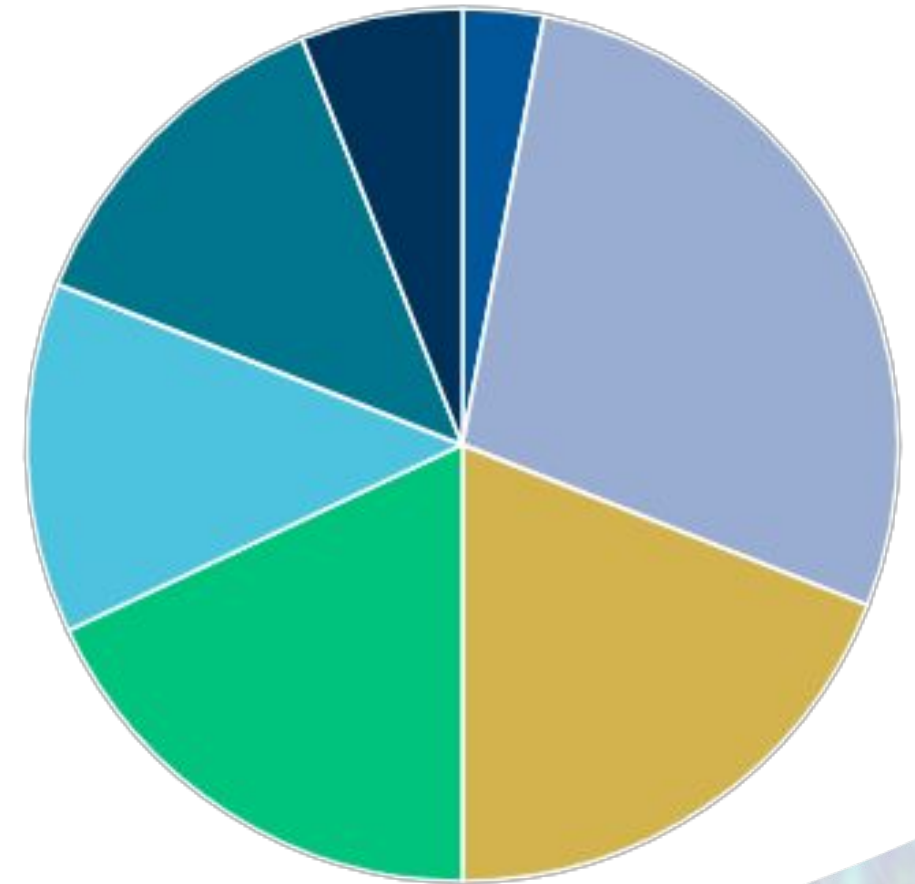
* Funding amount reflects total dollars obligated on SBIR/STTR awards and supplements made in FY 2020. This amount excludes 1) the SBIR/STTR admin fund, 2) any award that were made for purposes other than funding small businesses, and 3) awards and supplements that have been cancelled

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# Recent Phase I Awardee Stats & Outputs

| 10 or fewer employees | Founded in past five years | First-time SBIR/STTR winners |
|---|---|---|
| 95% | 81% | 59% |

**Outputs*** ▶

$14 billion

in follow-on institutional (equity) financing

200 successful exits

(acquisitions, mergers, IPOs)

*FY2016-FY2021. Pulled from Pitchbook as of Sept. 2020

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# Exploratory to Translational: Biomarker Colocalization



**BIOMARKER COLOCALIZATION THROUGH FLUORESCENCE**

The ExoView™ platform provides the ability to measure up to 4 markers on a single extracellular vesicle, with single binding event sensitivities. Measure even the smallest exosomes with confidence.
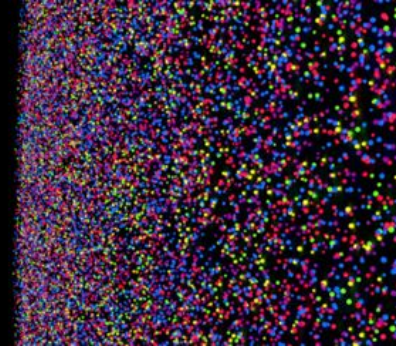
**1996**
NSF CAREER award to PI Selim Ünlü, Boston U

**2011**
PFI award to Ünlü and student, David Freedman

**2013**
Team completes NSF I-Corps

**2015**
NSF SBIR Phase I award

**2018**
NSF SBIR Phase II award

**2020**
Company completes fundraising round – raises $15M

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- Innovation programs

- Funding opportunities

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- Resources and upcoming events

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