



NSF Industry Partnership Summit

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April 26, 2023
Industry Partnership Summit

Welcome to the National Science Foundation!

- Thank you, thank you,
thank you!
- Please introduce yourself
before you speak.



Thank you!



Strengthening
University-Industry
Partnerships



Today

- **Objective:** Identify effective strategies for public-private partnerships that advance fundamental + translational research, workforce development, and infrastructure
- **Attendees:** Senior S&T leaders from leading companies, plus NSF leaders
- **Format:**
 - Panel on current industry partnerships
 - Breakouts on Future Partnerships, Tech Areas, Workforce Development
- **Future:** This is the first meeting!



Stage-setting this morning

- Introduction to NSF
- Brief overview of our new Directorate for Technology, Innovation and Partnerships (TIP)
- Our early experiences with PPPs



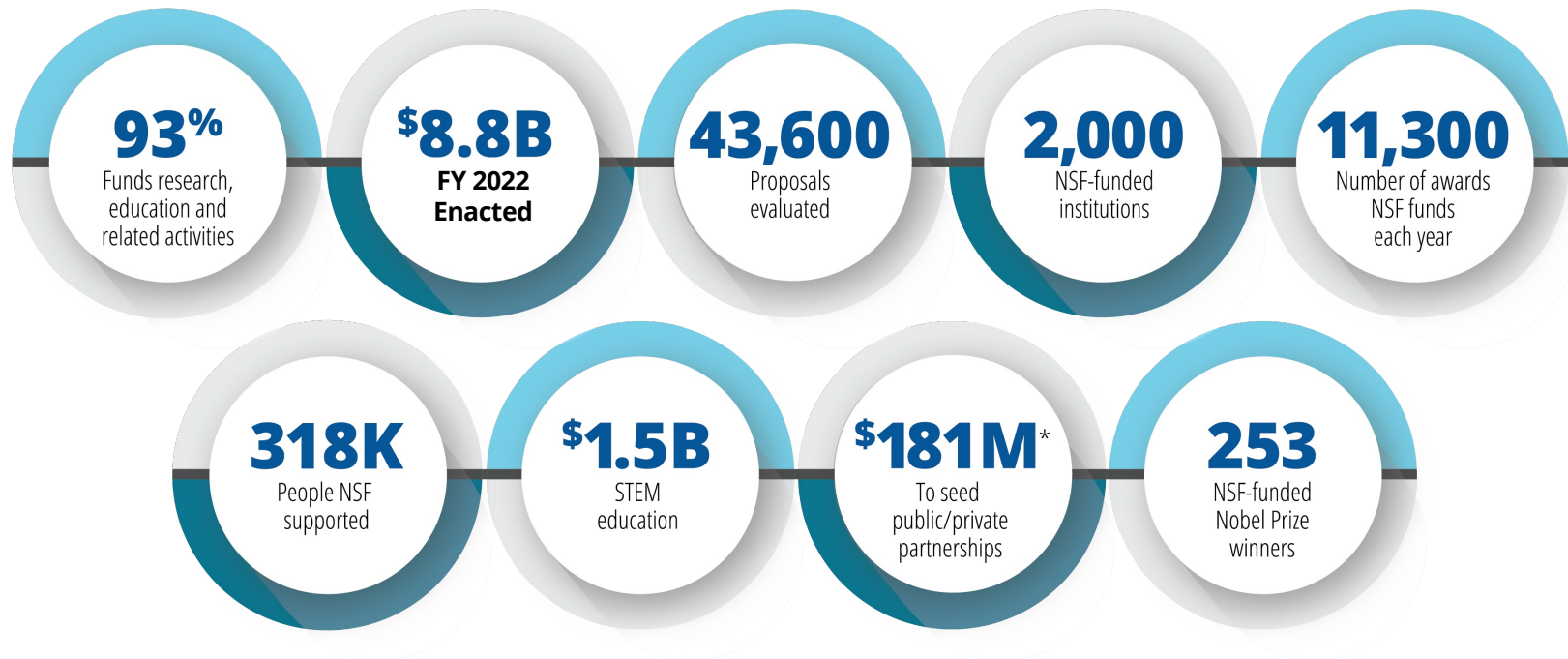
NSF mission: 1950 to present



NSF advances all fields of science & engineering



NSF by the numbers

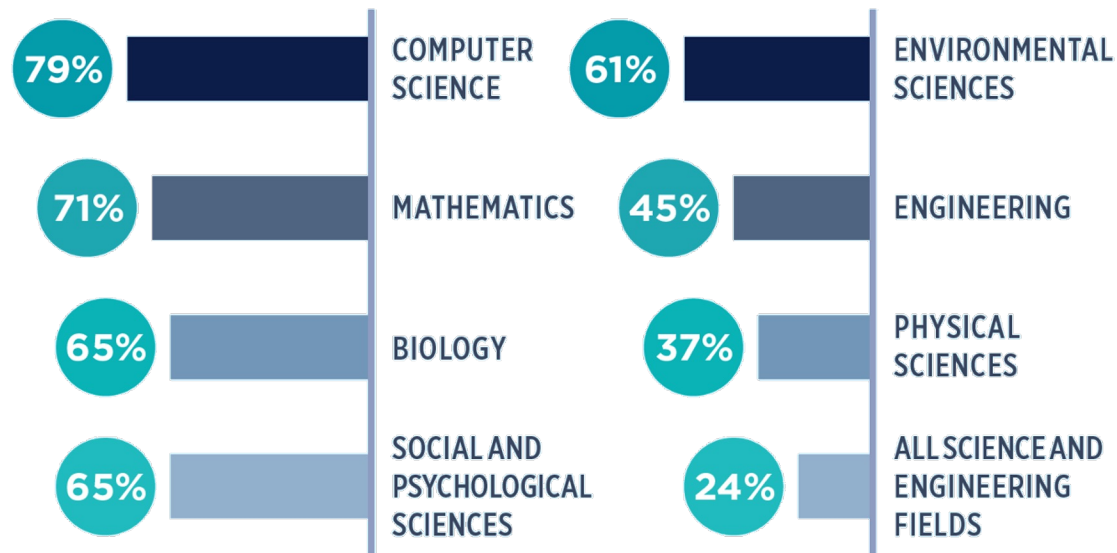


*Data represents FY 2021 Actuals unless otherwise indicated.
Corresponds to NSF investments initiated in FY 2021 and spanning multiple years.



NSF support of basic academic research

NSF SUPPORT OF ACADEMIC BASIC RESEARCH IN SELECTED FIELDS
(as a percentage of total federal support)



Case study: NSF advances artificial intelligence

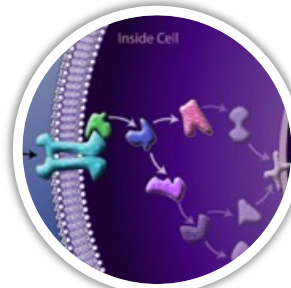
1970s:
**MACHINE
LEARNING**



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**



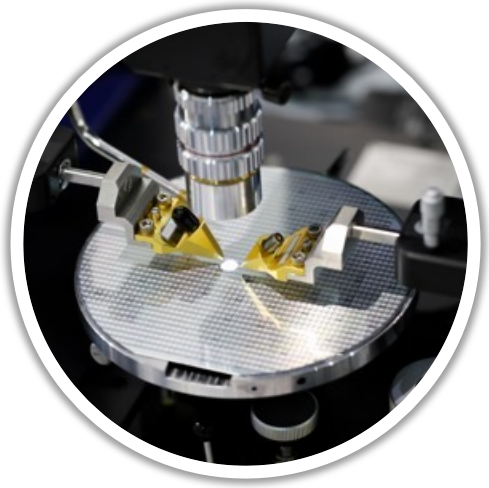
EMOTIENT STARTUP



A defining moment



An evolving research, innovation ecosystem



Pace of discovery
accelerated by data,
emerging technologies



Demand for
societal impact



Opportunity to leverage
partnerships



CHIPS and Science Act of 2022

- Appropriates \$54 billion for semiconductors incentives, R&D, workforce development
- Authorizes NSF, DOE, NIST, NASA
- **Authorizes \$81B for NSF:**
 - **+\$36B for the agency**
 - **Of that, +\$20B for TIP**
- **Authorizes a new NSF Directorate for Technology, Innovation and Partnerships**



CHIPS & Science Act: TIP

Subtitle G - Directorate for Technology, Innovation, and Partnerships

- *“...a new directorate to accelerate use-inspired and translational research and technology development to advance solutions to pressing societal challenges.”*
- Purpose: *“...to support translational research, accelerate the development and use of federally funded research, strengthen U.S. competitiveness through development of key technologies, and expand student and researcher participation and the U.S. workforce in key technologies and in areas of societal, national, geostrategic importance.”*



A new “horizontal” to enhance use-inspired and translational research



DIRECTORATE FOR TECHNOLOGY, INNOVATION AND PARTNERSHIPS (TIP)



Catalyzing a paradigm shift

Today

- Largely investigator-driven
- Primarily academic research teams
- Stream of discoveries improve prosperity, resilience, quality of life

“Technology / supply push”



Tomorrow

- Users / beneficiaries engaged in shaping, conducting research
- Multi-sector teams – academia, industry, government, civil society, communities of practice
- Important societal and/or economic problems drive research pursuits

“Market / demand pull”

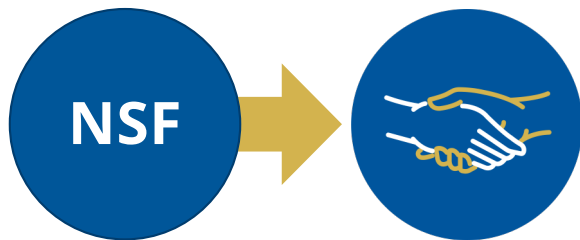


Partnership modalities

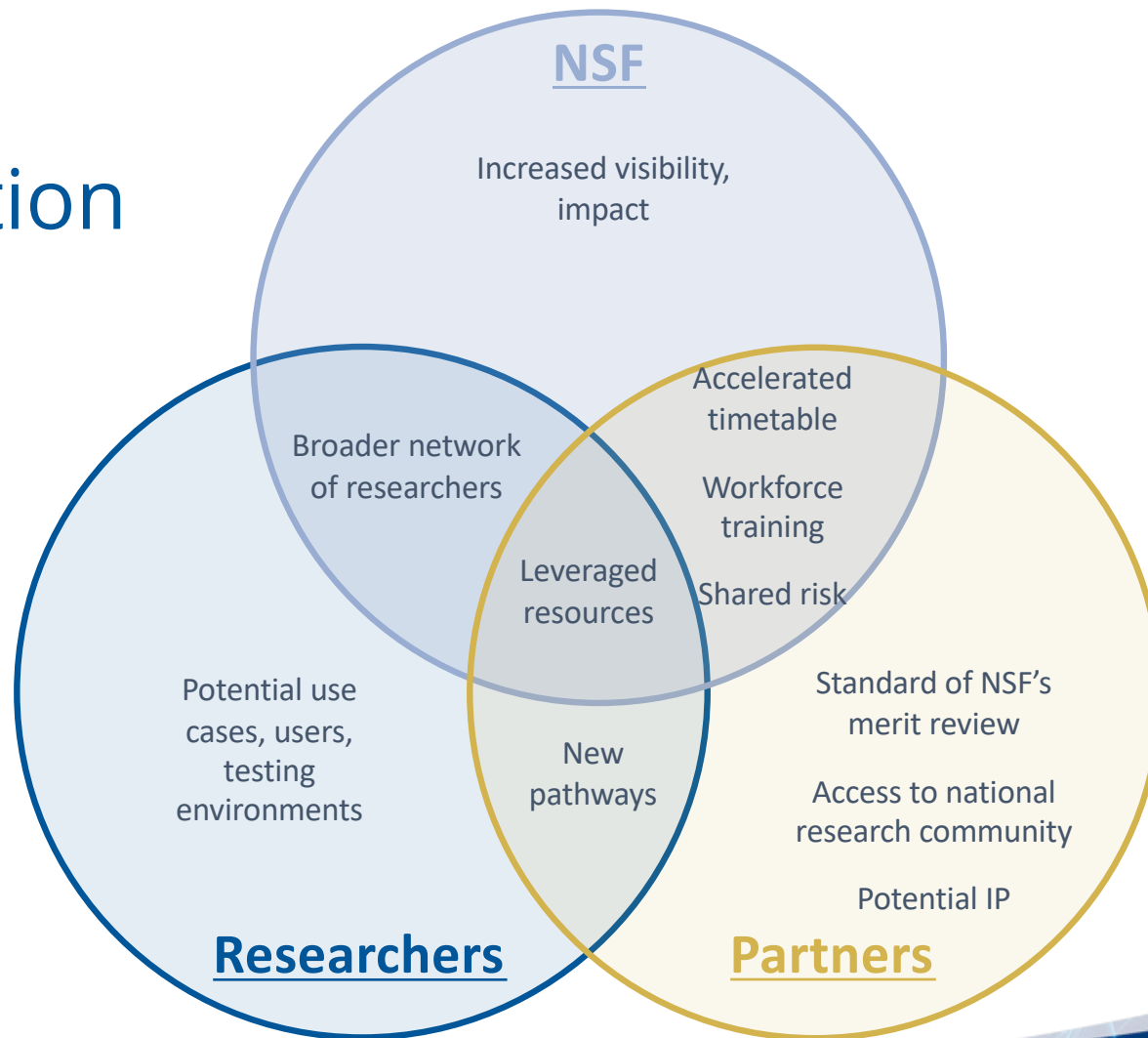
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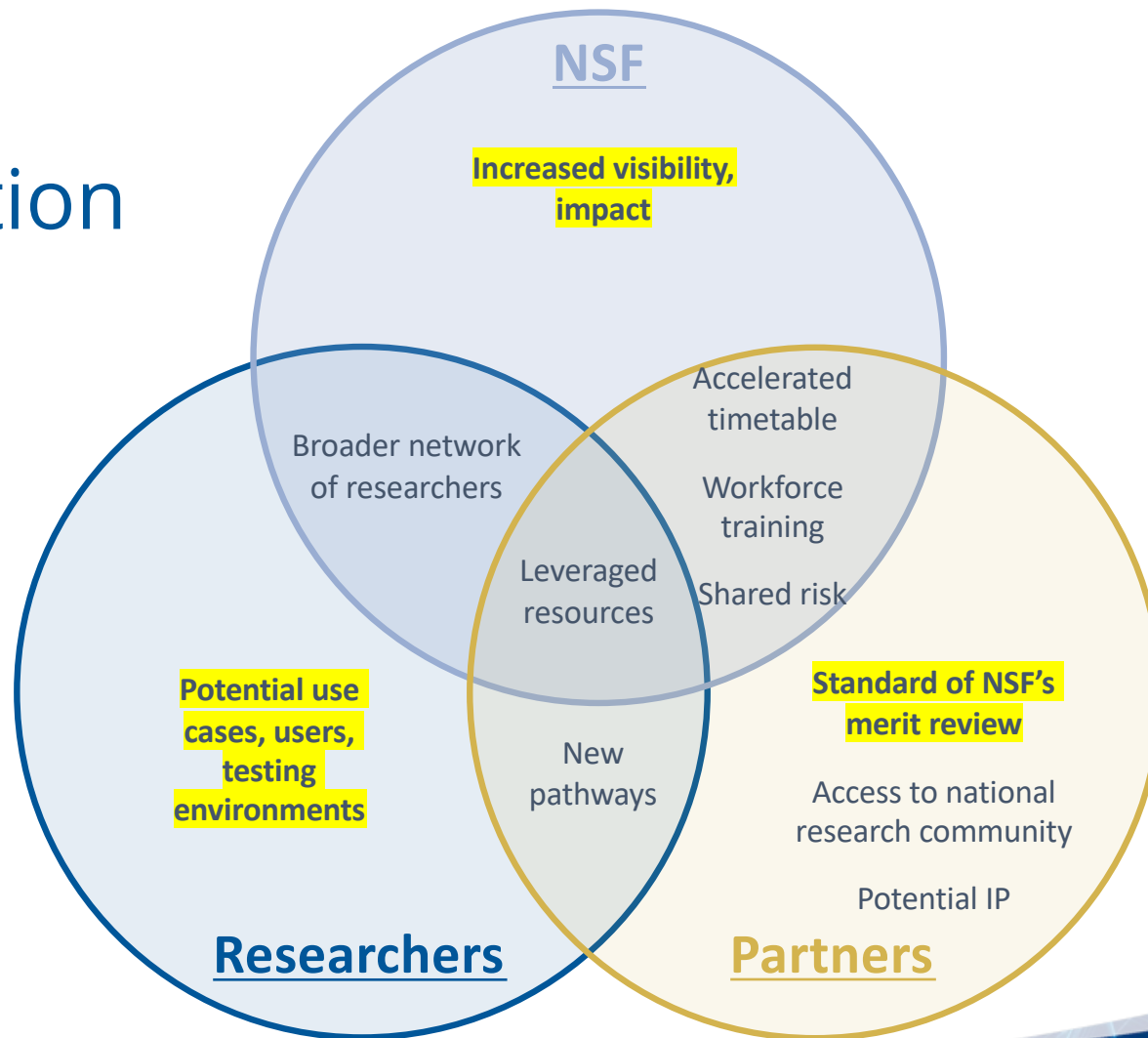
Catalyzed



Value proposition



Value proposition



Guiding principles for partnerships



Benefits

Clear and aligned value proposition



Costs and risks

Value outweighs potential costs, risks



Outcomes

Research, education, infrastructure impacts



Advancing America's semiconductor workforce

"To help develop and attract a pipeline of skilled talent from within the region, Intel plans to invest approximately \$100 million over the next decade in partnership with ... the U.S. National Science Foundation [ranging] from collaborative research projects to building semiconductor-specific curricula for associate and undergraduate degree programs."



"Significant investments such as this one will allow us to harness the best ideas from around the country to drive future semiconductor design and manufacturing as well as develop a diverse, next-generation semiconductor workforce, reaffirming U.S. competitiveness in this vital area. Today's announcement builds on our long history of collaboration with industry like Intel to accelerate fundamental research and rapidly bring solutions to market."

- Sethuraman Panchanathan
U.S. National Science Foundation Director

JANUARY 2022

Micron Foundation,
National Science
Foundation and
Schumer announce

\$10 million

commitment to
semiconductor
education



"[NSF] announced a cross-sector partnership with Micron Technology, Inc. to develop bold, potentially transformative solutions to address semiconductor manufacturing challenges and workforce shortages. NSF and Micron will each invest \$5 million in support of research, education, infrastructure capacity building, and workforce development..."

NOVEMBER 2022



Accelerating Artificial Intelligence

- Multiple industry partners
- Partners agree to provide annual unrestricted donations
- Partner input to request for proposals
- Post-award, partner companies may make available:
 - Resources, e.g., software (prototypes or products), data sets
 - Researchers-in-residence

accenture

amazon

Google

IBM

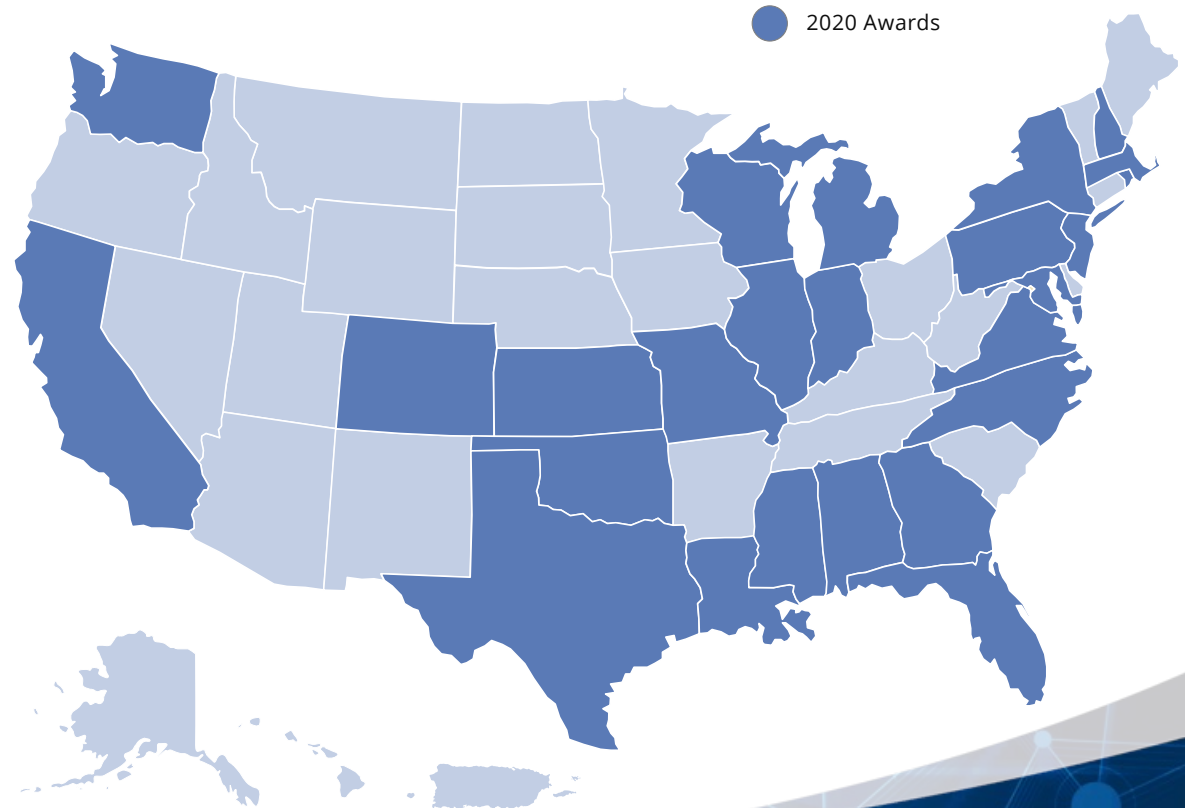
intel



AI Institutes: “Catalyzed” partnerships

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



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Academic collaborators

- **University of Oklahoma** (Lead)
- Colorado State University
- North Carolina State University
- University of Albany, SUNY
- TX A&M U Corpus Christi (MSI)
- University of Washington
- Del Mar College (MSI)
- University Corporation for Atmospheric Research/ National Center for Atmospheric Research

Local collaborators

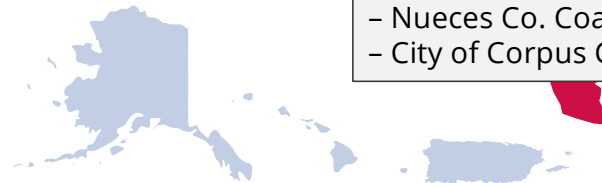
- Oklahoma Climate Survey,
- Division of Homeland Security and Emergency Services (NY)
- DOT (NY)
- Department of Env. Conservation (NY)
- NY Thruway
- NY Independent System Operator
- NY Power Authority
- NWS Texas Coastal offices
- National Park Service (in TX)
- Texas General Land Office
- Texas DOT
- Texas Commission on Environmental Quality
- Nueces Co. Coastal Parks
- City of Corpus Christi

Industry collaborators

- Google
- IBM (The Weather Company)
- Nvidia
- Disaster Technologies, Inc.
- and others

Federal collaborators

- **NOAA**: National Severe Storms Laboratory, Storm Prediction Center
- **NOAA**: National Geodetic Survey
- **NOAA**: Center for Operational Oceanographic Products and Services
- **Navy**: National Hurricane Center, Joint Typhoon Warning Center



Partnering on NSF's priorities



**STRENGTHENING
ESTABLISHED NSF**



**INSPIRING
MISSING MILLIONS**



**ENSURING THE
SUCCESS OF TIP**

Create Opportunities Everywhere

Build a Resilient Planet

Advance Emerging Industries for National and Economic Security

Strengthen Research Infrastructure



CHIPS & Science Act: Challenges & Focus Areas

- Challenges:
 - United States national security.
 - United States manufacturing and industrial productivity.
 - United States workforce development and skills gaps.
 - Climate change and environmental sustainability.
 - Inequitable access to education, opportunity, or other services.
- Initial Key Technology Focus Areas:
 - Artificial intelligence, machine learning, autonomy, and related advances.
 - High performance computing, semiconductors, and advanced computer hardware and software
 - Quantum information science and technology.
 - Robotics, automation, and advanced manufacturing.
 - Natural and anthropogenic disaster prevention or mitigation.
 - Advanced communications technology and immersive technology.
 - Biotechnology, medical technology, genomics, and synthetic biology.
 - Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics.
 - Advanced energy and industrial efficiency technologies, e.g., batteries, advanced nuclear technologies, for electric generation
 - Advanced materials science, incl composites 2D materials, other next-generation materials, and related manufacturing technologies



Today's call to action

- **Objective:** Identify effective strategies for public-private partnerships that advance fundamental + translational research, workforce development, and infrastructure
- **Let's learn from the past**
- And then **let's generate out-of-the-box ideas for the future:**
 - Mechanisms of partnering
 - Key technology focus areas
 - Education and workforce development



Vision for success

- New partnership models, modalities
- 2-3 “coalitions” in specific challenge and focus areas primed for deeper dives
- A next meeting, and then another, to build from today



TIP Technology, Innovation and Partnerships

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