

Agenda

Directorate for Engineering Report

NSF Budget Update

Response to Coronavirus

Industries of the Future

Reports from Advisory Committee Liaisons

SBIR/STTR Subcommittee

Discussion with Director's Office

Strategic Recommendations for ENG





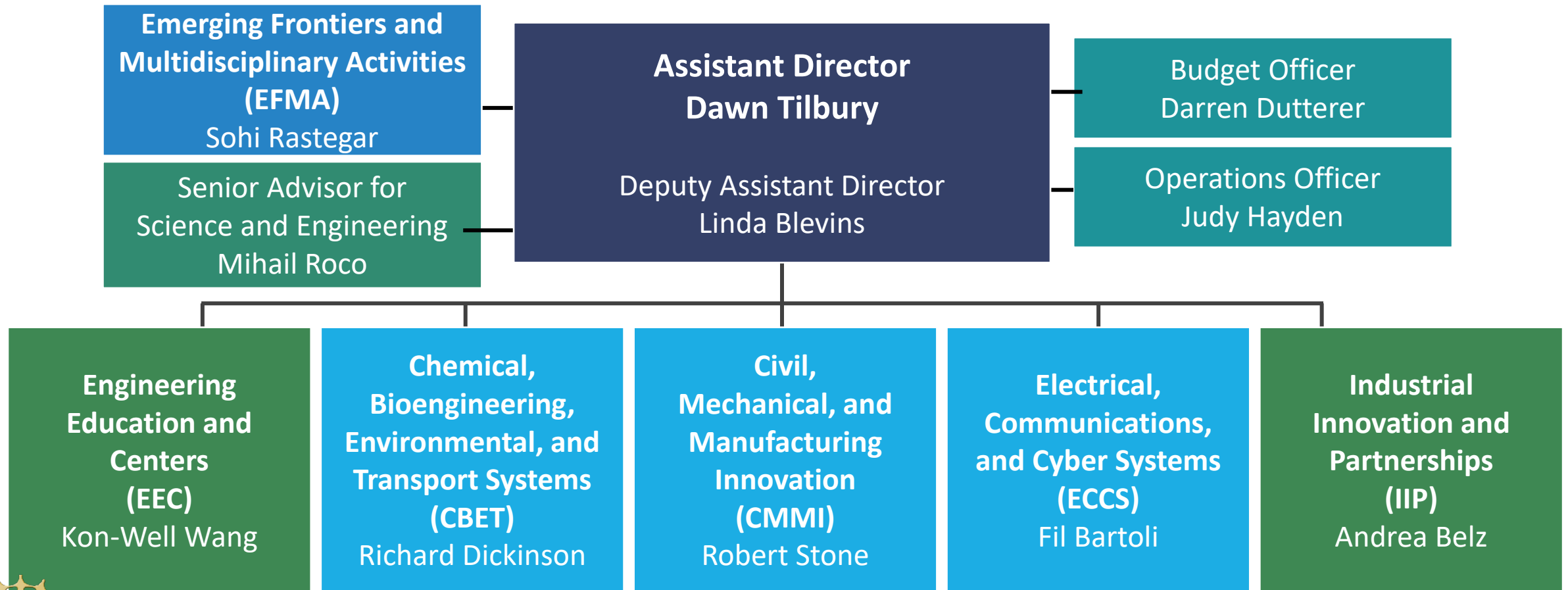
Directorate for Engineering Report

DAWN TILBURY, NSF ASSISTANT DIRECTOR FOR ENGINEERING
DIRECTORATE FOR ENGINEERING ADVISORY COMMITTEE MEETING
APRIL 7, 2020



ENG People

NSF Directorate for Engineering



Open ENG Leadership Position

CMMI Deputy Division Director



An official website of the United States government

USAJOBS [Sign In](#) [Help](#) [Search](#)

Deputy Division Director, Division of Civil, Mechanical and Manufacturing Innovation, ENG

[National Science Foundation](#)

Overview [Locations](#) [Duties](#) [Requirements](#) [Required Documents](#) [Benefits](#) [+](#)

Overview [? Help](#)

Open & closing dates 🕒 03/02/2020 to 04/08/2020	Service Senior Executive
Pay scale & grade ES 00	Salary \$172,508 to \$189,500 per year
Appointment type Permanent - SES Career Only	Work schedule Full-Time

Location [? Help](#)

1 vacancy in the following location:

📍 **Alexandria, VA**
1 vacancy

Open ENG Program Director Positions

CBET

- Combustion and Fire Systems
- Disability and Rehabilitation Engineering (DARE)
- Engineering of Biomedical Systems

CMMI

- Engineering for Civil Infrastructure
- Manufacturing Systems Design

ECCS

- Communications, Circuits and Sensing Systems
- Energy, Power, Control, and Networks

EEC

- Engineering Research Centers

IIP

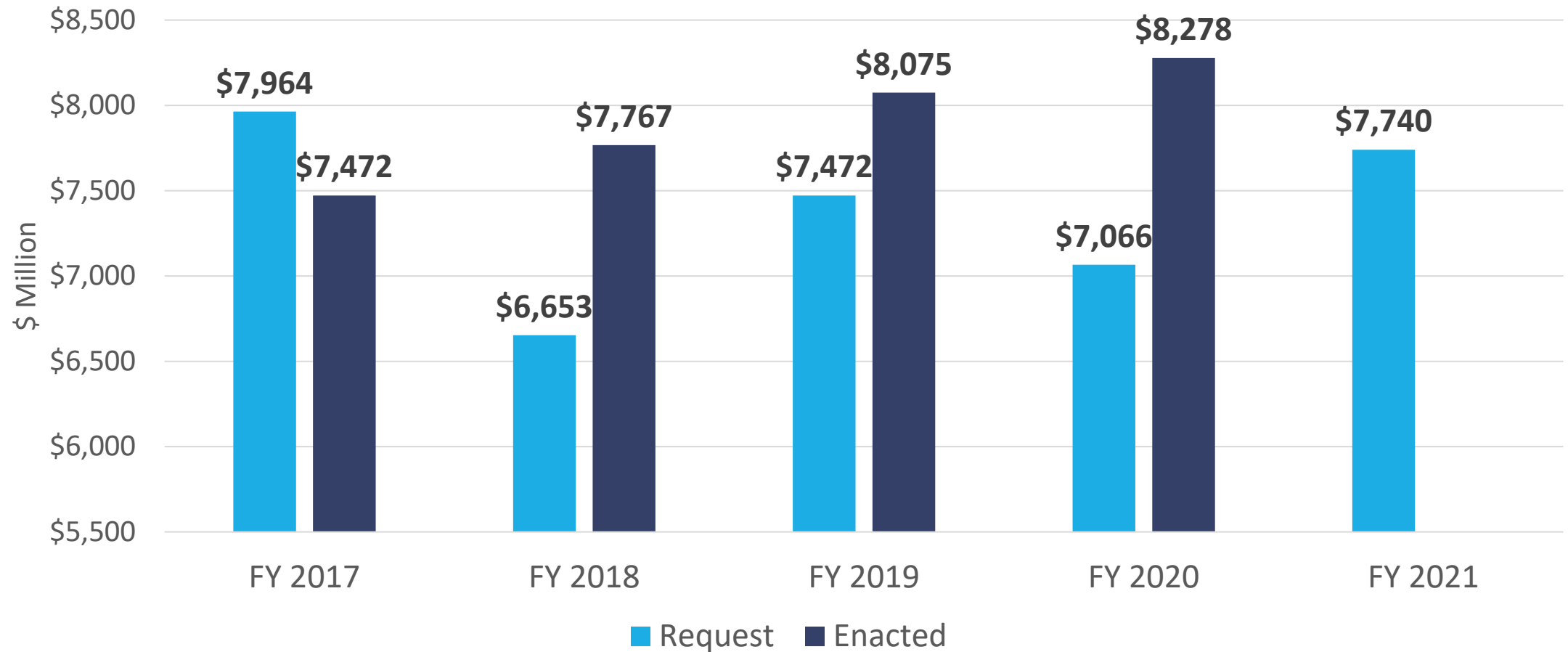
- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)



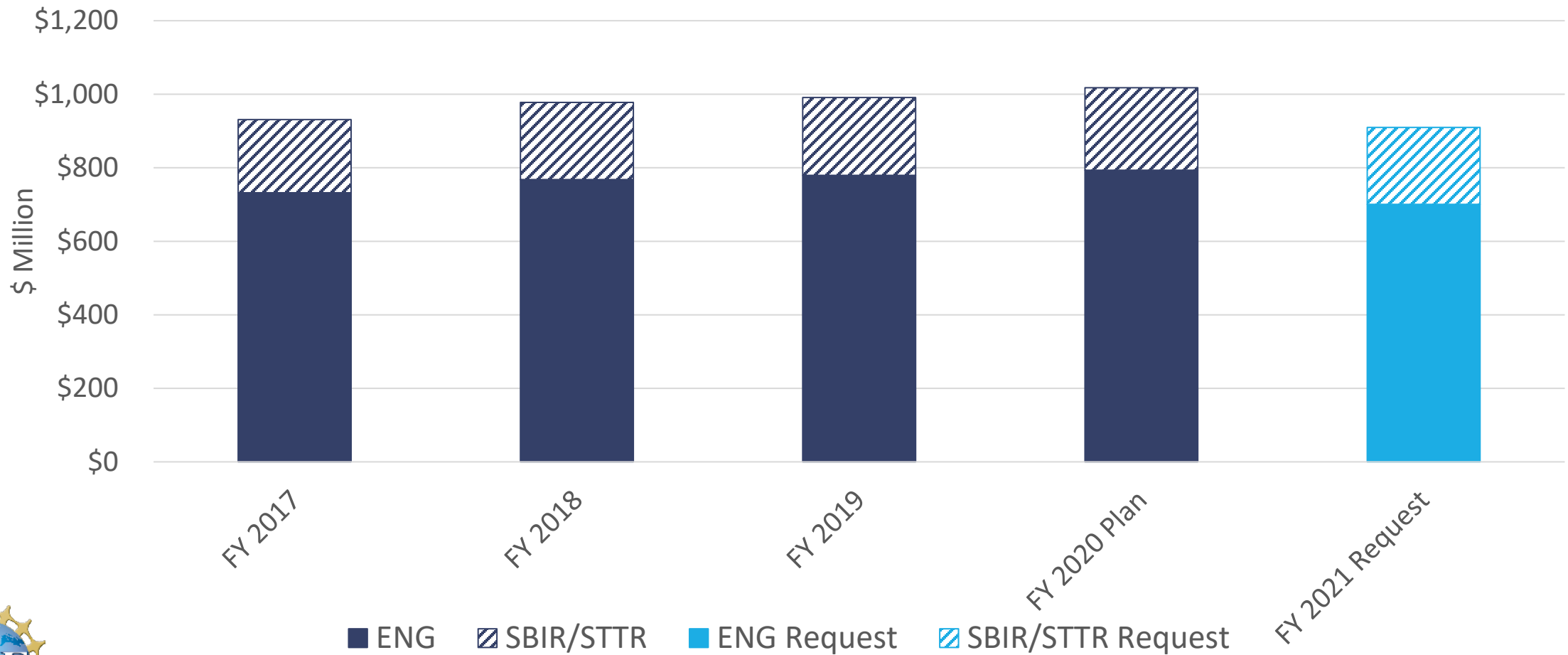


ENG Budget

NSF Budget



ENG and SBIR/STTR Budgets





NSF Big Ideas

NSF's 10 Big Ideas: FY 2021 Investment



NSF 2026 Idea Machine

To identify areas for long-term
NSF investment

FY 2019

- 33 videos and narratives
- Blue ribbon panel

FY 2020

- Winners and prizes
- Research community activities to explore winning ideas



National Science Foundation

Welcome to the NSF 2026 Idea Machine

A competition sponsored by the National Science Foundation (NSF) to help set the U.S. agenda for fundamental research in science and engineering.

Help us select the most pressing research questions that need to be answered in the coming decade by commenting on the entries shown below.

Show More

Comments have closed. View all of the finalist entries below.

SHARE



SORT



Find By Title



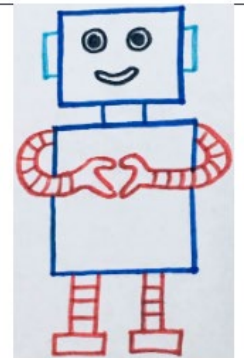
Mechanical Morality

LEARN MORE



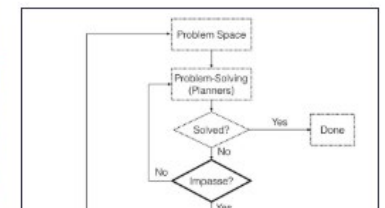
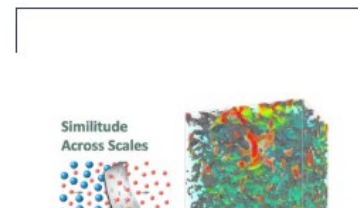
APPEAR EDU

LEARN MORE



Promoting Empathy-Based AI

LEARN MORE



Mid-Scale Research Infrastructure: Engineering Workshops



ENG will support research conferences to identify critical needs in mid-scale research infrastructure

- Infrastructure to serve a research community at a national needs level
- Potential to significantly advance engineering research

NSF INCLUDES



To enhance U.S. leadership in science and engineering by developing STEM talent from all sectors of our society

FY 2020

- NSF INCLUDES Planning Grants to build capacity for the development of collaborative infrastructure
- NSF INCLUDES Report to the Nation II
- Partnerships with 8 federal agencies
 - NSF-NASA Building MSI-Led Coalitions to Strengthen Broadening Participation in Engineering workshop in January
 - NSF INCLUDES-NASA Minority University Research and Education Project (MUREP) planning grant opportunity





ENG Investments

New Programs and Solicitations

Foundational Research in Robotics

Disrupting Operations of Illicit Supply Networks

Gen-4 Engineering Research Centers

Multimodal Sensor Systems for Precision Health Enabled by Data Harnessing, Artificial Intelligence, and Learning (SenSE)

Reproducible Cells and Organoids via Directed-Differentiation Encoding (RECODE)

Signals in the Soil



Signaling the health of tree-pit soil for storm water management
Images courtesy Ioannis Kymissis, Columbia University

New Dear Colleague Letters

Critical Aspects of Sustainability (CAS): Micro- and Nanoplastics (MNP)

Open Science for Research Data

Plant Synthetic Biology

Research Opportunities for the Directorate for Engineering in Artificial Intelligence

Secure Analog-RF Electronics and Electromagnetics (SARE)



Mid-size Research Opportunities

Emerging Frontiers in Research and Innovation (EFRI)

Addressing Systems Challenges through Engineering Teams (ASCENT)

Environmental Convergence Opportunities in Chemical, Bioengineering, Environmental, and Transport Systems (ECO-CBET)

Leading Engineering for America's Prosperity, Health, and Infrastructure (LEAP HI)



Resilient urban infrastructure that integrates the natural and built environments

Image courtesy Northwestern University



I-Corps Hubs

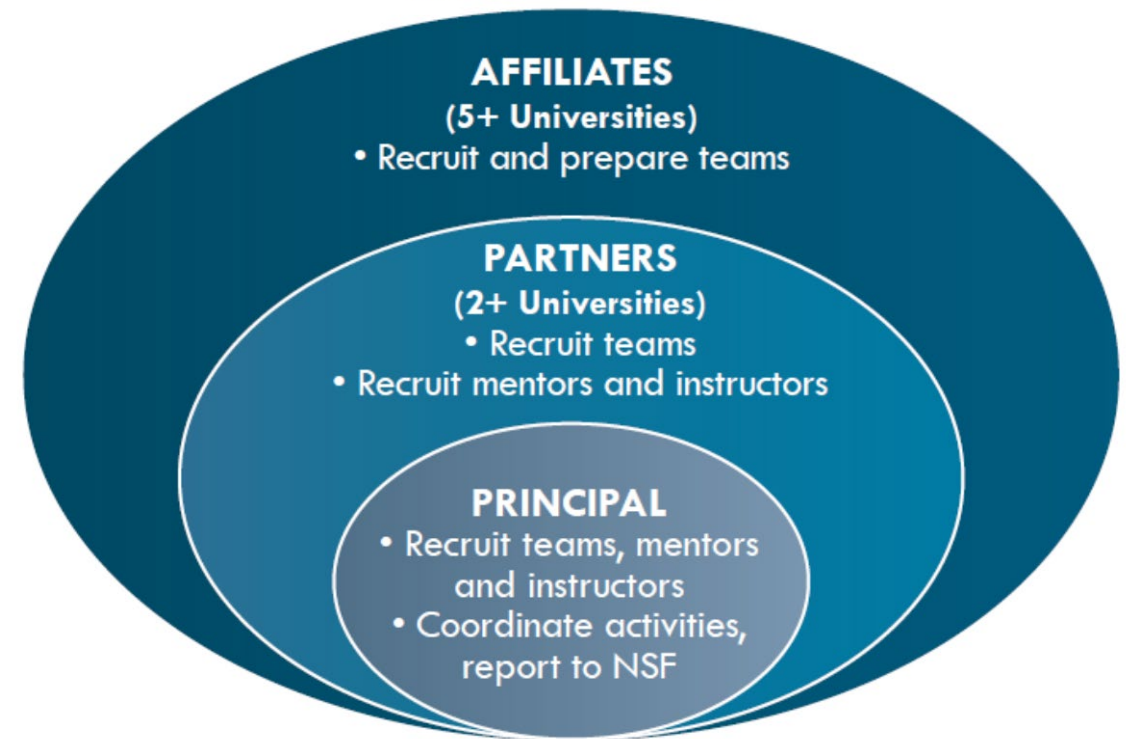
New model to support efficient expansion

Deep regional connection

Access to National innovation Network resources

Solicitation NSF 20-529:
proposals due August 13, 2020

NEW HUB MODEL



NSF Convergence Accelerator

Use-inspired, convergence research from concept to deliverables in areas of national importance

Partnerships between academic and non-academic stakeholders

Pilots running in 3 tracks, 43 awards

FY 2020

- NSF Convergence Accelerator Pilot Phase II solicitation is out
- New solicitation coming
- **NSF is now seeking ideas and conference proposals for future topics**



International Collaboration Opportunities



- Research Collaboration Opportunity in Europe for NSF Awardees
- United States-Ireland-Northern Ireland R&D Partnership
- International Collaboration Supplements in Quantum Information Science and Engineering Research
- NSF/NSFC Joint Research on Environmental Sustainability Challenges

Visioning

To speak with a unified voice on bold and high-impact fundamental research priorities that will

- advance the state of current engineering endeavors, and
- enable rapid and efficient responses to emerging opportunities and/or national needs

Engineering Research Visioning Alliance (ERVA) solicitation

- Webinar April 22



ENGINEERING RESEARCH
FRAMEWORK VISIONING SUMMIT

July 16 – 18, 2019
Embassy Suites, 1900 Diagonal Rd.
Alexandria, VA 22314

ASEE

The banner features a central photograph of a person standing on a mountain peak, looking out over a vast, hazy mountain range. The top and bottom of the banner have a light blue background with a geometric, network-like pattern. The NSF logo is on the left, and the ASEE logo is on the right.

A Look Ahead

Continuing the Big Ideas

EEC and IIP Committees of Visitors

4th-Generation ERC awards

First EFRI awards in Distributed Chemical Manufacturing and in Engineering the Elimination of End-of-Life Plastics

Call for new EFRI topics

Industries of Future investments



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Alternative/Backup Slides



Future of Work at the Human-Technology Frontier

Addresses technology, workers, and work and focuses on the impact and implications of technological advances

FY 2019

- Research projects and planning projects

FY 2020

- Stewardship
- Collaboration on FW-HTF Convergence Accelerator
- Foundational activities



Shared Autonomy for the Dull, Dirty, and Dangerous:
Exploring Division of Labor for Humans and Robots
to Transform the Recycling Sorting Industry

Image courtesy Yale University

Harnessing the Data Revolution

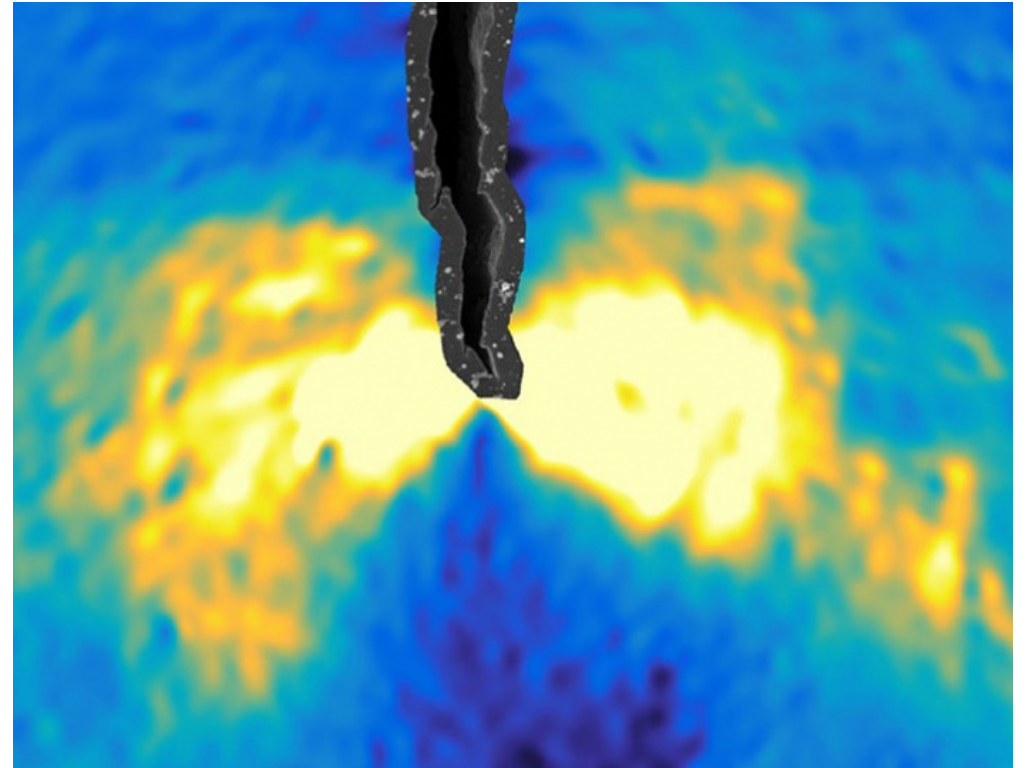
Accelerates discovery and innovation
in data-intensive science and
engineering

FY 2019

- HDR Ideas Labs
- HDR Frameworks
- TRIPODS
- Data Science Corps

FY 2020

- Collaboration on HDR Convergence Accelerator
- Foundational activities



HDR IDEAS² Institute: Data-Driven Frameworks
for Materials Discovery

Image courtesy Samantha Daly, UCSB



Quantum Leap

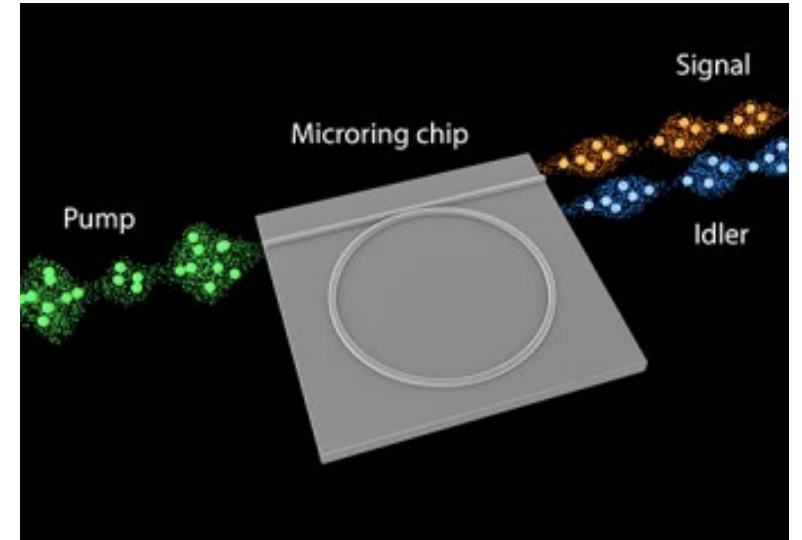
Fundamental quantum research leading to sensing, computing, modeling, and communicating breakthroughs

FY 2019

- Q-AMASE-i: Quantum Foundry
- QII-TAQS: Quantum Idea Incubator for Transformational Advances in Quantum Systems
- Challenge Institutes - conceptualization grants

FY 2020

- Challenge Institutes
- Foundational activities



All-Photonic Quantum Network

Image credit Michal Lipson, Columbia University

Understanding the Rules of Life

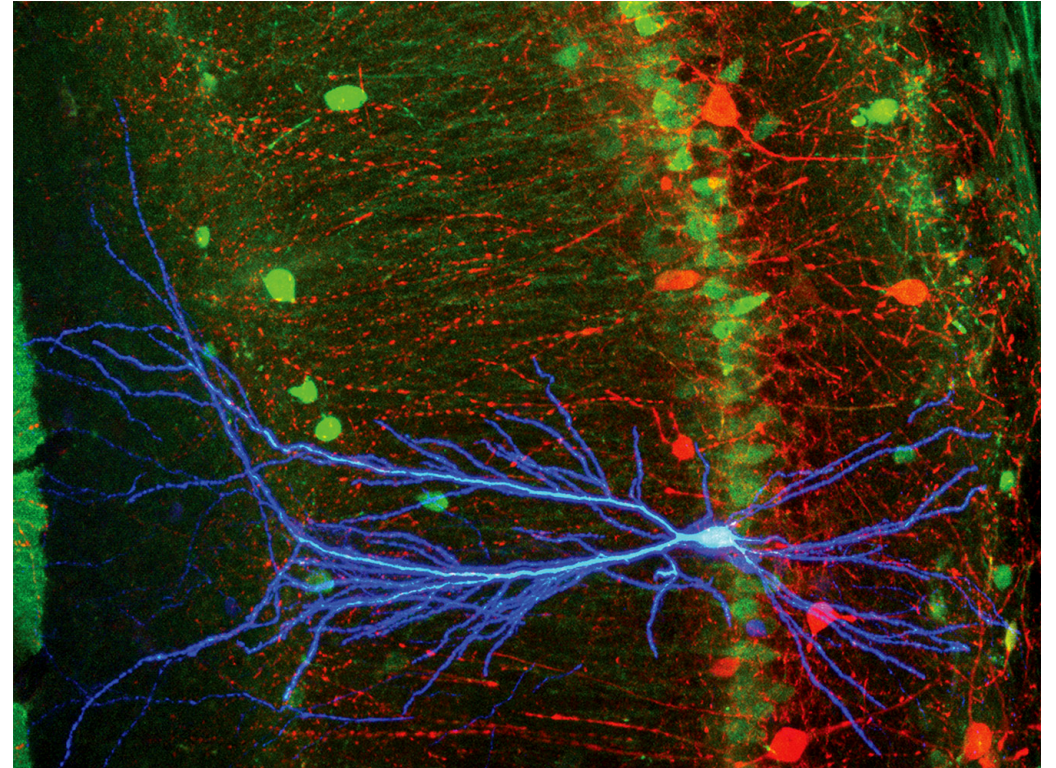
Elucidating and harnessing the sets of rules that predict an organism's observable characteristics

FY 2019

- Building a Synthetic Cell Ideas Lab and awards
- Epigenetics

FY 2020

- Foundational activities



Bottom-up Construction of a Synthetic Neuron and Programmable Neuronal Network

Image courtesy of T. Siapas/Caltech

Navigating the New Arctic

Innovations in Arctic observational networks and convergence research that address the intersection of natural, social, and built systems

FY 2019

- Research projects and planning projects

FY 2020

- Foundational activities



Landscape evolution and adapting to change in ice-rich permafrost systems

Image courtesy Donald Walker, University of Alaska-Fairbanks



Growing Convergence Research

To address complex problems that require convergence paradigms to catalyze scientific discovery and innovation at the nexus of traditional disciplines

FY 2019

- GCR RAISE
- GCR
- Convergence Accelerator

FY 2020

- GCR continues



Convergence Around the Circular Economy. Pitt, RIT, UIUC, UMaine, UIC. *Image credit: Lea Rae/Shutterstock*

NSF INCLUDES



To enhance U.S. leadership in science and engineering by developing STEM talent from all sectors of our society

FY 2019

- NSF INCLUDES National Network: 3 alliance awards and 11 supplements
- Re-Entry of Women and Women Veterans in the STEM Workforce: 2 conferences and 5 traineeships
- Increasing the Number of Women in Mechanical Engineering: conference

FY 2020

- NSF INCLUDES Planning Grants to build capacity for the development of collaborative infrastructure



Mid-Scale Research Infrastructure

Mid-scale Research Infrastructure-1 (Mid-scale RI-1)

- Awards for design or implementation projects
- \$75 million for 10 awards

Mid-scale Research Infrastructure-2 (Mid-scale RI-2)

- \$150 million planned investment

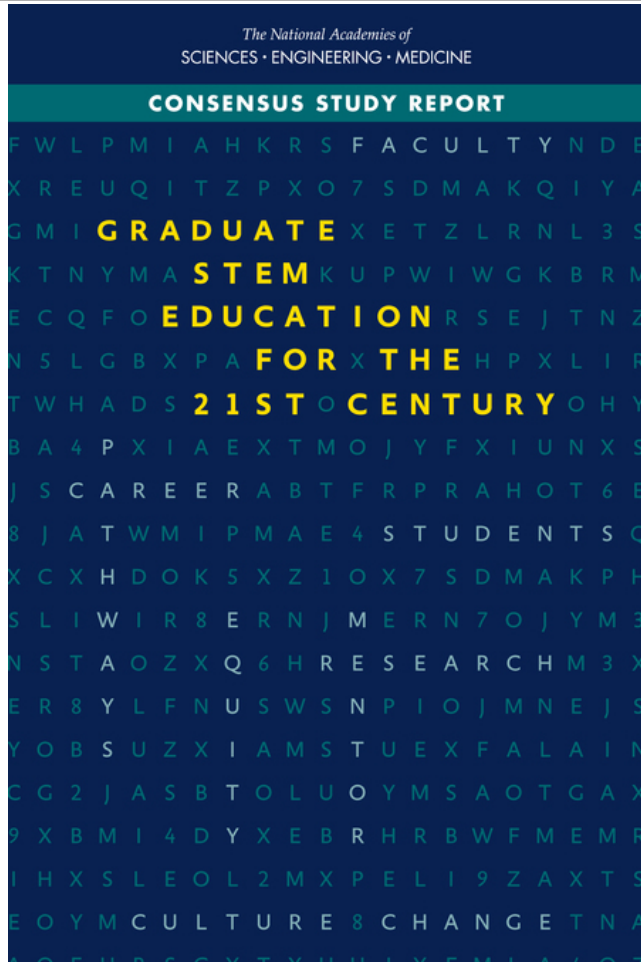


NSF's Partnerships

FY 2018 Snapshot
with examples



Non-Academic Research Internships for Graduate Students (INTERN) Supplements



Advances NSF-funded basic research through collaborations with industry, small businesses and national labs

- ~450 graduate students during FY 2017-2019



4th Generation Engineering Research Centers (ERC)

Gen-4 ERCs support convergent research and innovation through inclusive partnerships and workforce development for national impact

- New Gen-4 ERC competition with summer FY 2022 awards
- First Gen-4 ERC awards in summer FY 2020

Planning Grants for building capacity

- \$10 million awarded in FY 2018-2019 for 100 planning grants



Grantee workshop, October 1-2, 2019

Image credit: ASEE - Miguel Ventura