Engineering Programs at NSF
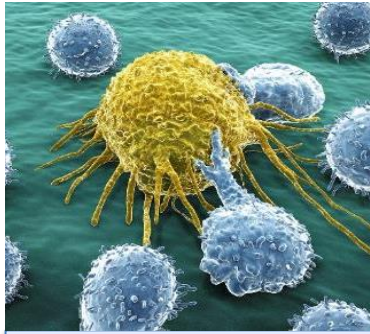
October 2, 2018

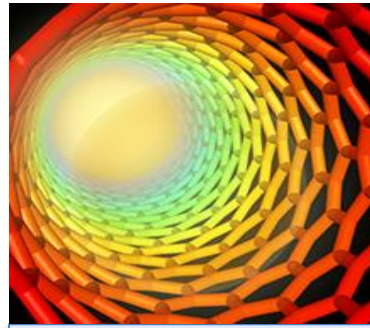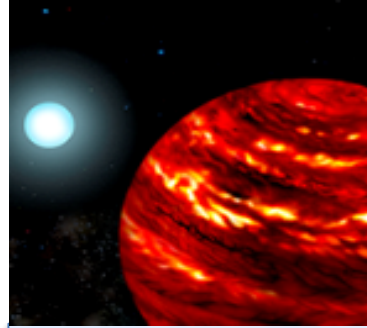Dawn Tilbury, Assistant Director, Engineering

NSF Champions Research and Education across all Fields of Science and Engineering

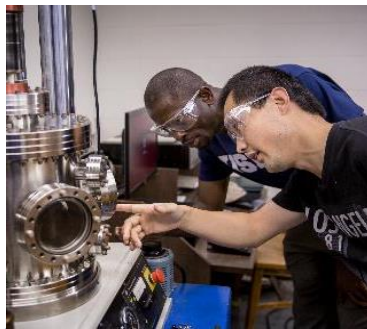**Biological Sciences**

Engineering

Mathematical & Physical Sciences

Computer & Information Science & Engineering

Geosciences (including Polar Programs)

Integrative Activities

Education & Human Resources

Social, Behavioral & Economic Sciences

International Science & Engineering

NSF by the Numbers

93%
funds research, education and related activities

$7.5B
FY 2017 Enacted

50,000
proposals evaluated

2,000
NSF-funded institutions

11,000
awards funded

359,000
people NSF supported

$1.2B
STEM education

$100M
to seed public/private partnerships

231
NSF-funded Nobel Prize winners

Numbers shown are based on FY 2017 activities.

NSF Big Ideas

RESEARCH IDEAS

Harnessing Data for 21st Century Science and Engineering

Work at the Human-Technology Frontier: Shaping the Future

Navigating the New Arctic

Windows on the Universe: Multi-messenger Astrophysics

Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

PROCESS IDEAS

Mid-scale Research Infrastructure

NSF 2026

Growing Convergence Research at NSF

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

" … bold questions that will drive NSF's long-term research agenda -- questions that will ensure future generations continue to reap the benefits of fundamental S&E research. "

FY 2019 Budget Request

President's FY 2019 Budget Request for NSF

- Flat with respect to FY 2017 Enacted
- "will invest in priority areas like advancing NSF's big ideas"
- *Accelerators:* for two convergent Big Ideas - Harnessing the Data Revolution, Future of Work at the Human Technology Frontier
  - focus on convergence, translational research, and partnerships
  - managed in NSF Office of Integrative Activities

NATIONAL SCIENCE FOUNDATION
SUMMARY TABLE
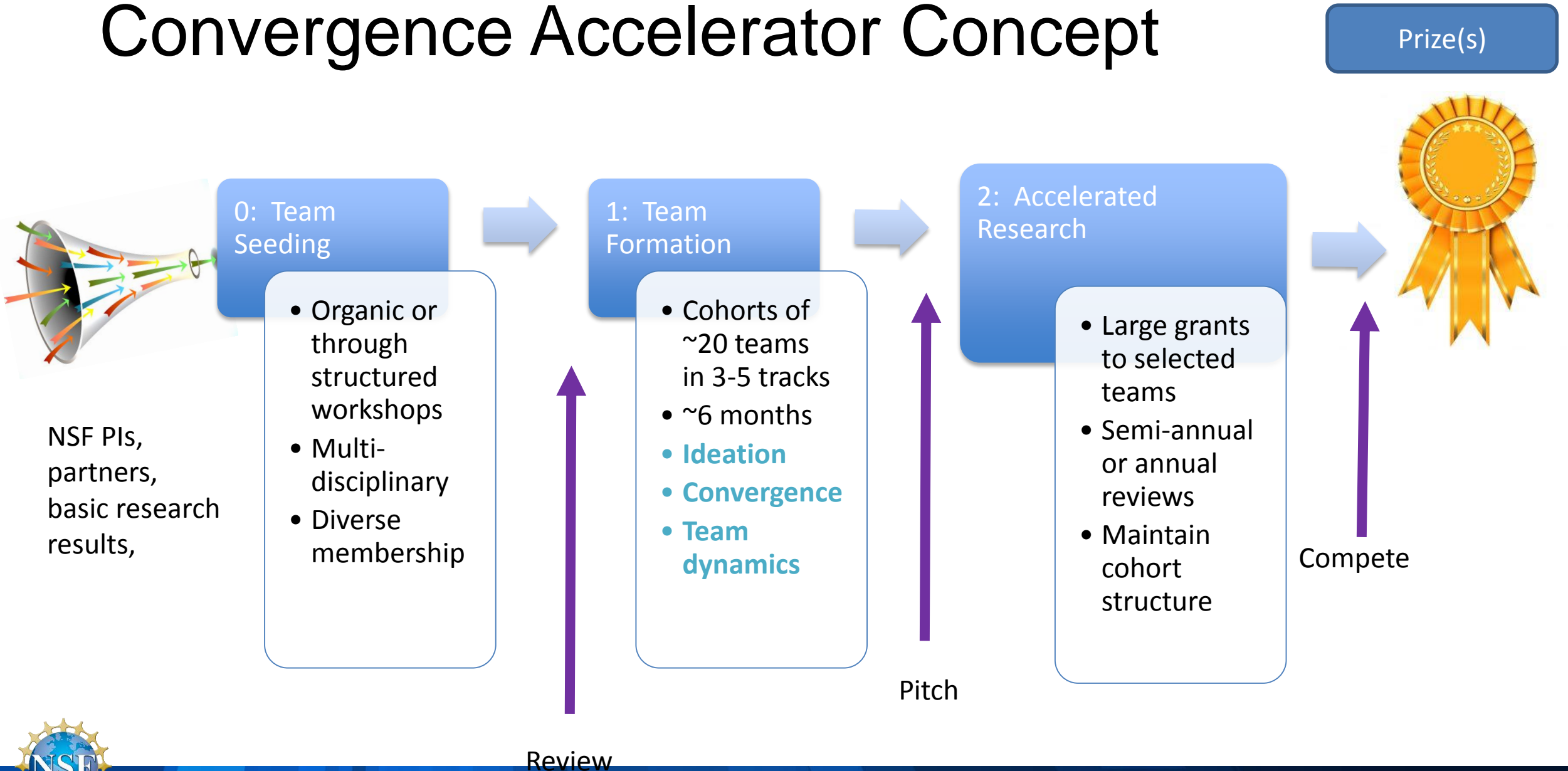**FY 2019 BUDGET REQUEST TO CONGRESS**
(Dollars in Millions)

NSF by Account	FY 2017 Actual	FY 2018 Annualized CR	FY 2019 Request	FY 2019 Request change over FY 2017 Actual Amount	Percent
BIO	$742.22	-	$738.16	-$4.06	-0.5%
CISE	935.93	-	925.42	-10.51	-1.1%
ENG	930.92	-	921.43	-9.49	-1.0%
Eng Programs	*731.87*	*-*	*722.86*	*-9.01*	*-1.2%*
SBIR/STTR	*199.05*	*-*	*198.57*	*-0.48*	*-0.2%*
GEO	825.62	-	852.98	27.36	3.3%
MPS	1,362.43	-	1,345.32	-17.11	-1.3%
SBE	270.89	-	246.19	-24.70	-9.1%
SBE Programs	*219.70*	*-*	*195.00*	*-24.70*	*-11.2%*
NCSES	*51.19*	*-*	*51.19*	*-*	*-*
OISE	48.96	-	48.50	-0.46	-0.9%
OPP	467.85	-	534.54	66.69	14.3%
IA	420.27	-	536.72	116.45	27.7%
U.S. Arctic Research Commission	1.43	-	1.42	-0.01	-0.7%

https://www.nsf.gov/about/budget/fy2019/pdf/fy2019budget.pdf
(above table: Summary-Tables-3)

Convergence Accelerator Concept

NSF Steps to Stop Harassment

> THIS NEW POLICY IS INTENDED TO PROVIDE TARGETED, SERIOUS CONSEQUENCES FOR HARASSERS. IT GIVES PEOPLE TOOLS TO MAKE HARASSMENT STOP WITHOUT DISTURBING OTHERS' CAREERS AND LIVES.

France Córdova, NSF Director
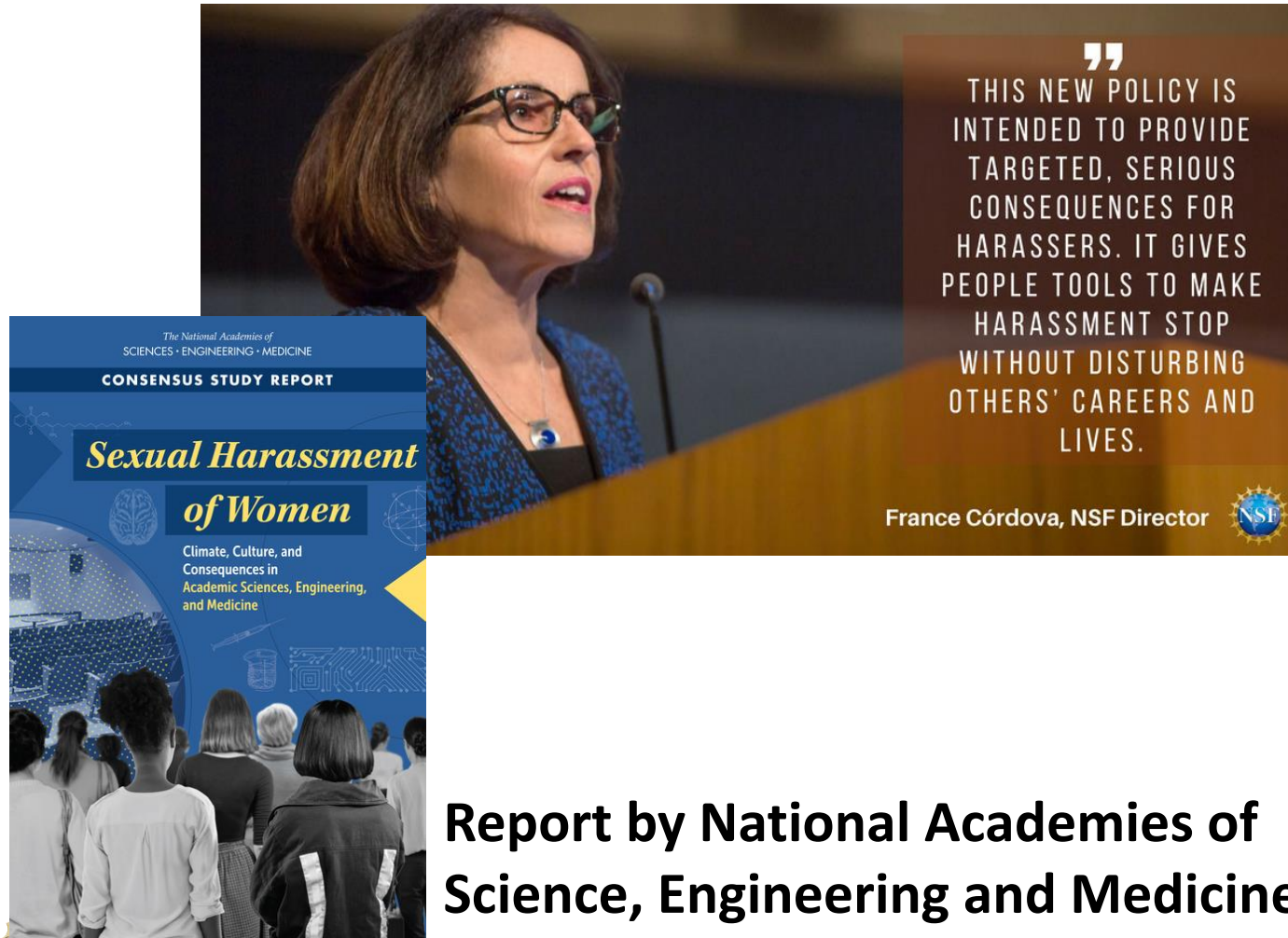
Report by National Academies of Science, Engineering and Medicine

Sexual Harassment of Women
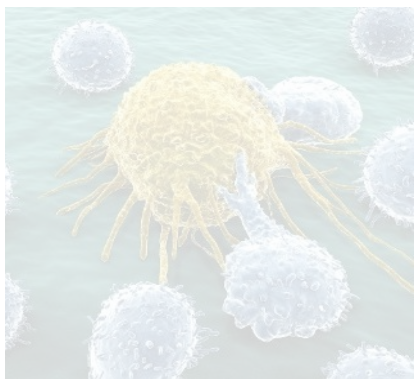Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine
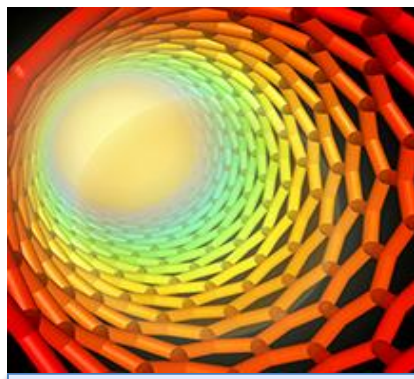
- Awardee organizations must report findings of harassment, sexual harassment or sexual assault
  - In effect October 21, 2018

- Secure online portal accepts harassment notifications
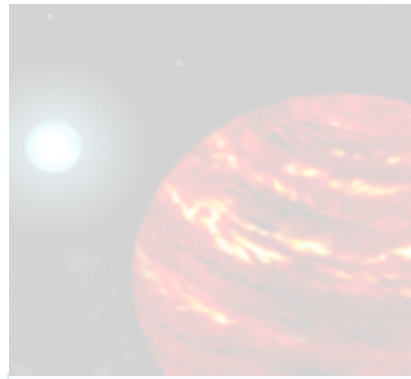- **nsf.gov/harassment**

Directorate for Engineering

Biological Sciences

Engineering

Mathematical & Physical Sciences

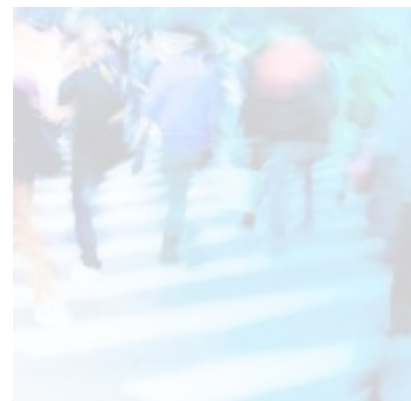Computer & Information Science & Engineering

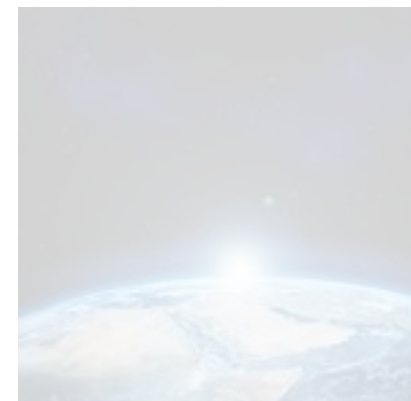Geosciences (including Polar Programs)

Integrative Activities

Education & Human Resources

Social, Behavioral & Economic Sciences

International Science & Engineering

NSF Directorate for Engineering

Emerging Frontiers and Multidisciplinary Activities (EFMA)
Sohi Rastegar

Senior Advisor for Science and Engineering
Mihail Roco

**Assistant Director
Dawn Tilbury**

Deputy Assistant Director
Linda Blevins

Budget Officer
Darren Dutterer

Operations Officer
Judy Hayden

Engineering Education and Centers (EEC)
Don Millard (acting)

Chemical, Bioengineering, Environmental, and Transport Systems (CBET)
Richard Dickinson

Civil, Mechanical, and Manufacturing Innovation (CMMI)
Mary Toney (acting)

Electrical, Communications, and Cyber Systems (ECCS)
Fil Bartoli

Industrial Innovation and Partnerships (IIP)
Barry Johnson

ENG by the Numbers: FY 2017

$931 M — FY 2017 research budget

13,028 proposals

731 panels

19% Competitive award success rate

2,455 competitive awards

23,522 people supported

8,811 senior researchers

2,067 other professionals

527 postdoctoral associates

7,607 graduate students

4,510 undergraduate students
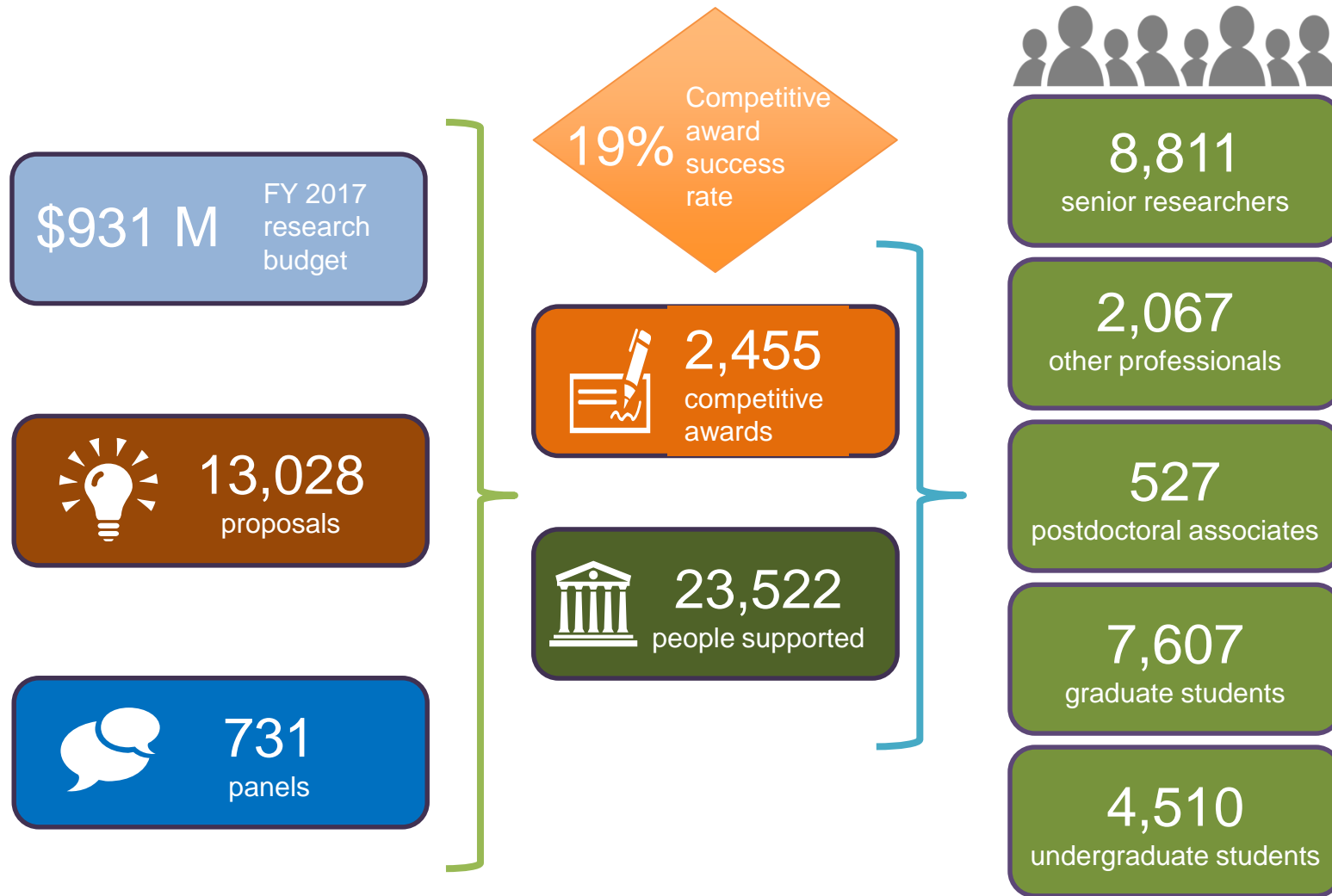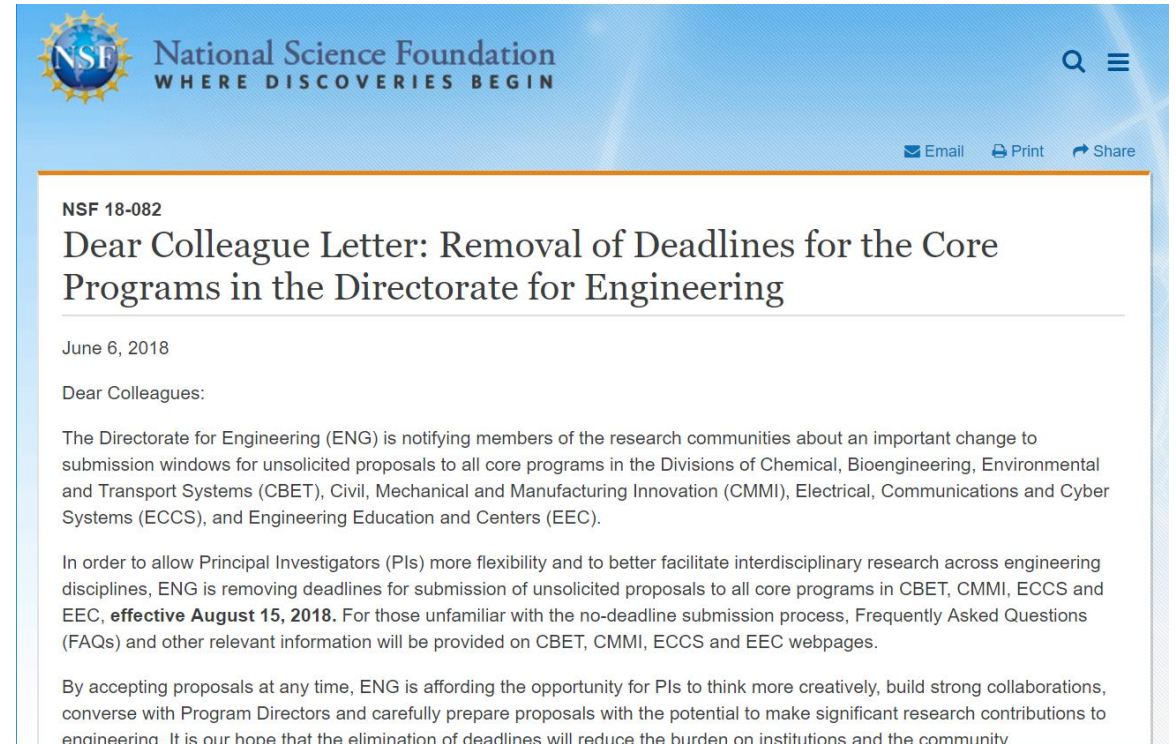
Shift to No Deadlines

- Unsolicited proposals to all core programs in four ENG divisions (CBET, CMMI, ECCS, and EEC) are accepted any time
  - Declined proposals face a 1-year moratorium before resubmission

- New flexibility to carefully craft proposals for significant contributions

A New Vision for Center-Based Engineering Research

A New Vision for Center-Based Engineering Research

CONSENSUS STUDY REPORT

The National Academies of SCIENCES · ENGINEERING · MEDICINE

CONVERGENCE

TEAM SCIENCE

GRAND CHALLENGES

Image: *National Academies Press, Copyright 2017, National Academy of Sciences*

2017:

- May : National Academies report
- Summer: Working group

2018:

- March: Solicitation for Planning Grants
- Sept.: Planning grants awarded
- Oct. 2-3: Planning grants workshop

Upcoming: Solicitation for GEN-4 ERC

The Future of Work at the Human-Technology Frontier

"a unique opportunity to actively shape the development and use of technologies to improve the quality of work while also increasing productivity and economic growth"

Research Themes
- Building the human-technology partnership
- Augmenting human performan[ce]
- Illuminating the socio-technol[ogical] landscape
- Fostering lifelong learning

National High School Engineering Pilot

- U.S. pilot will prepare teachers and a curriculum for a nationwide pre-college course on engineering principles and design.
- The three-year, $4-million pilot marks an important milestone in the creation of a nationally recognized high school engineering course, which is intended to lead to widely accepted, transferrable credit at the college level.

Partnerships catalyze innovations

- NSF supports industry-relevant research and knowledge transfer
  - Grant Opportunities for Academic Liaison with Industry (GOALI)
  - Industry–University Cooperative Research Centers (IUCRC)
 - Innovation Corps (I-Corps)
  - SBIR/STTR

76 active **IUCRCs**

876 unique members

7:1 match of NSF **$**

Emerging Frontiers in Research and Innovation

- <u>FY 2018-2019</u>
- Chromatin and Epigenetic Engineering
  - 8 projects awarded in FY 2018
- Continuum, Compliant, and Configurable Soft Robotics Engineering
  - 9 projects awarded in FY 2018
- <u>FY 2020</u>
- Topic ideas accepted through October 31, 2018
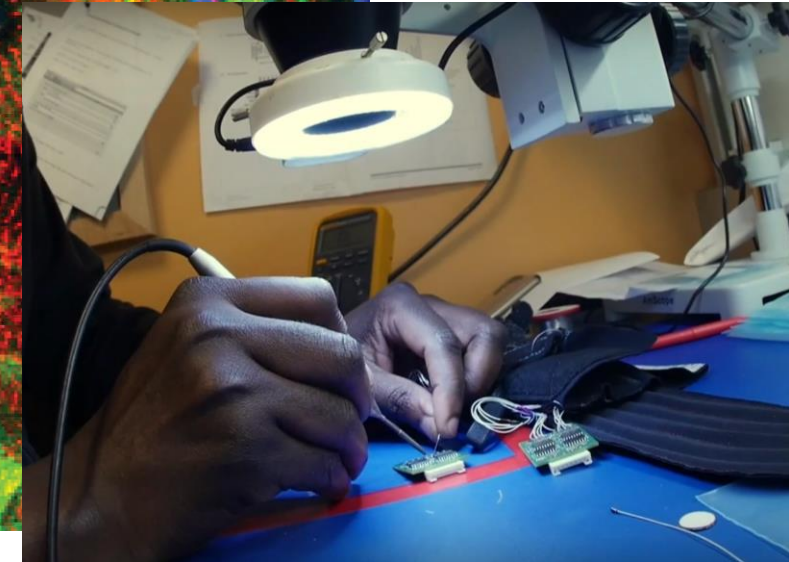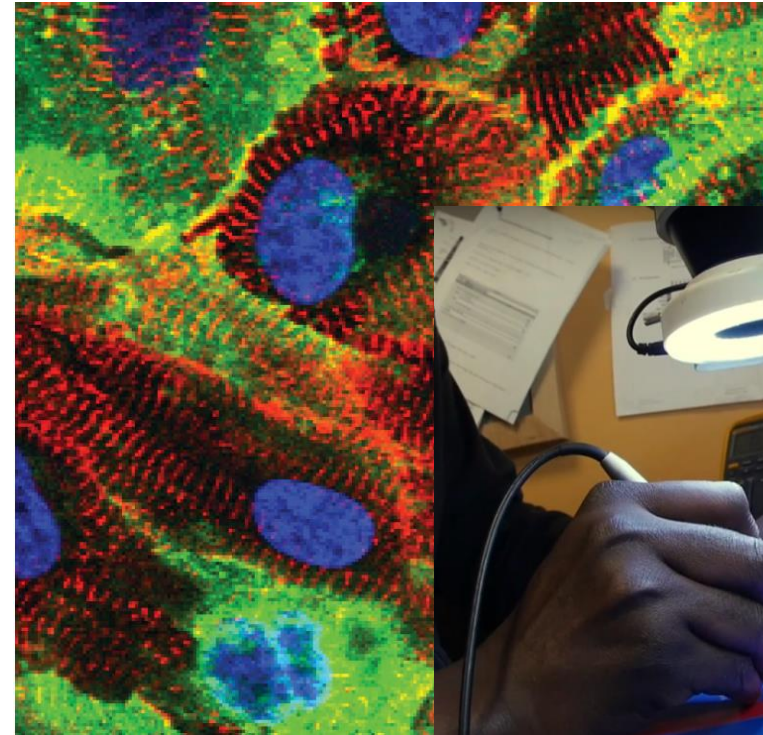
NSF 18-105

Dear Colleague Letter: Seeking Community Input for Topic Ideas for Emerging Frontiers in Research and Innovation (EFRI) Program

September 12, 2018

Dear Colleagues:

The purpose of this Dear Colleague Letter (DCL) is to invite the research community to submit suggestions for Topic Ideas to be considered for the FY 2020 Emerging Frontiers in Research and Innovation (EFRI) Program Solicitation. Suggestions for EFRI Topic Ideas are currently solicited and vetted every two years. Selected Topic(s) become the focus of research supported by the EFRI Program. Solicitations are announced annually for research proposals that fall under the specified Topic area(s).

This DCL is not a request for submission of a single research proposal idea: rather, it is

National Science Foundation

THE NSF 2026
IDEA MACHINE

- **Entrants suggest "grand challenge" questions for future research**

- **Video pitches & public comments**

- **A blue-ribbon panel advises NSF**

- **Best ideas receive public recognition, cash prizes**

- **Launches August 31, 2018**

- **https://www.nsf.gov/ideamachine**

Identifying new directions for research.

STEP 01	STEP 02	STEP 03	STEP 04	STEP 05	STEP 06	STEP 07	STEP 08	STEP 09	STEP 10
Competition opens/ entries accepted	NSF staff selects 30 representative entries	Videos invited & posted online	Public comments collected; NSF analysis added	Blue-Ribbon Panel picks 12 entries for remote interviews	Blue-Ribbon Panel recommends 6 entries	NSF staff adds analysis	NSF Leadership selects 2-4 winning entries	Prizes awarded for winning ideas	Funding opportunities

U.S. Undergraduate Enrollment in Engineering
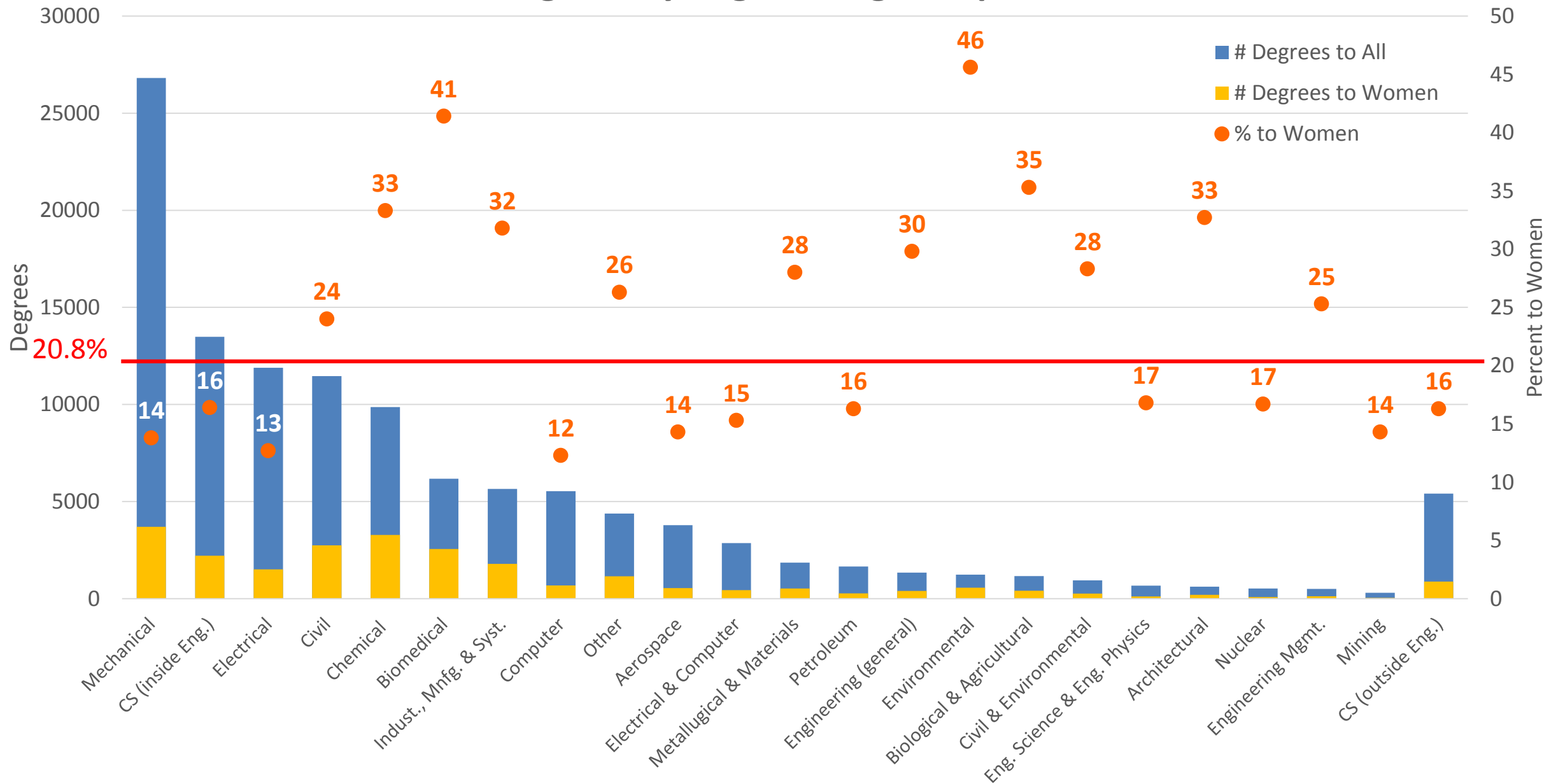

756,191

Nearly 77% growth in 10 years!

Bachelor's Degrees by Engineering Discipline, 2015-2016

Building the NSF INCLUDES National Network

- 70 Design and Development Launch Pilots awarded in FY2016 & FY 2017
- On Ramps: 5 Conferences, 4 EAGERS and 4 Supplements
- NSF INCLUDES Coordination Hub (Award #1818635)
  - *Facilitate activities needed to build and maintain a strong **NSF INCLUDES National Network**, including communications, technical assistance and efforts aimed at increasing visibility.*
- NSF INCLUDES Coordination Hub awarded in September 2018
- 5 NSF INCLUDES Alliances awarded in September 2018
  - NSF 18-529 Alliances solicitation proposal deadline: April 2, 2019

NSF Lineage: Basic research to commercialization