NSF Directorate for Engineering

BARRY JOHNSON

KARL ROCKNE

NSF GRANTS CONFERENCE
MAY 2019

NSF Strategic Plan for FY18-22

VISION

A Nation that is the global leader in research and innovation

MISSION

To promote the progress of science, to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes

GOALS

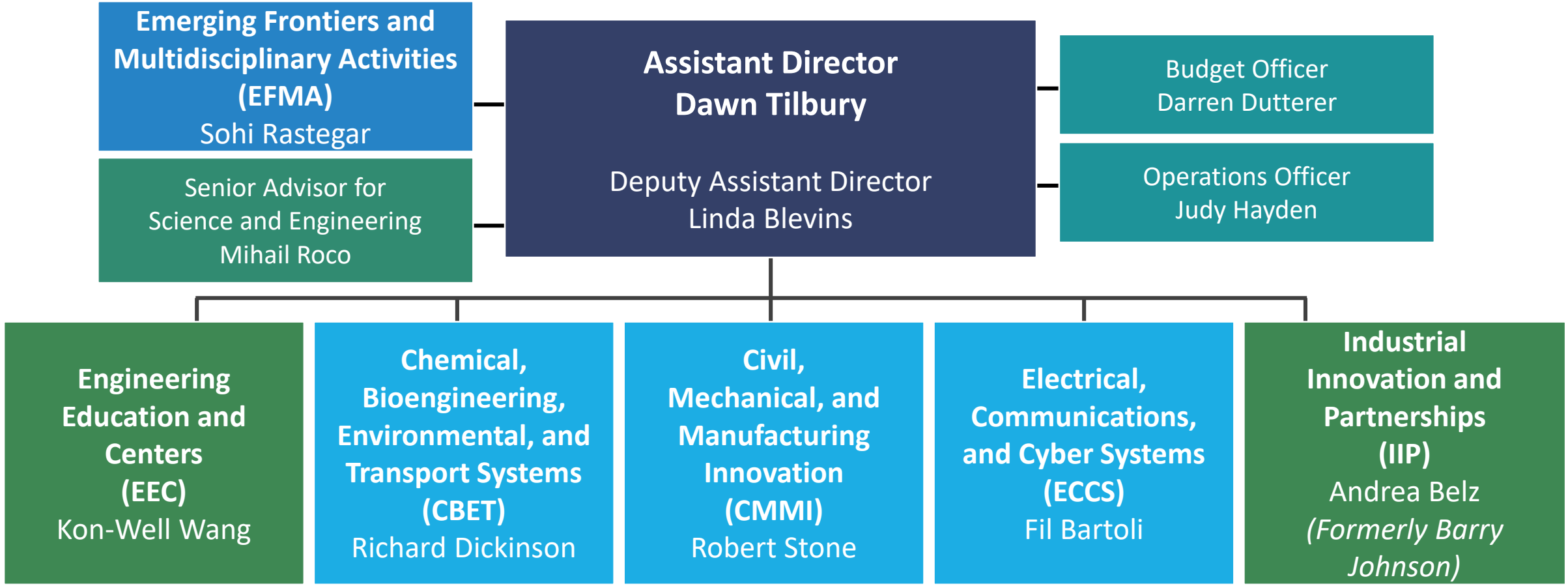
- Expand knowledge in science, engineering, and learning
- Advance the Nation's capability to meet current and future challenges
- Enhance NSF's performance of its mission

ENG Vision and Mission

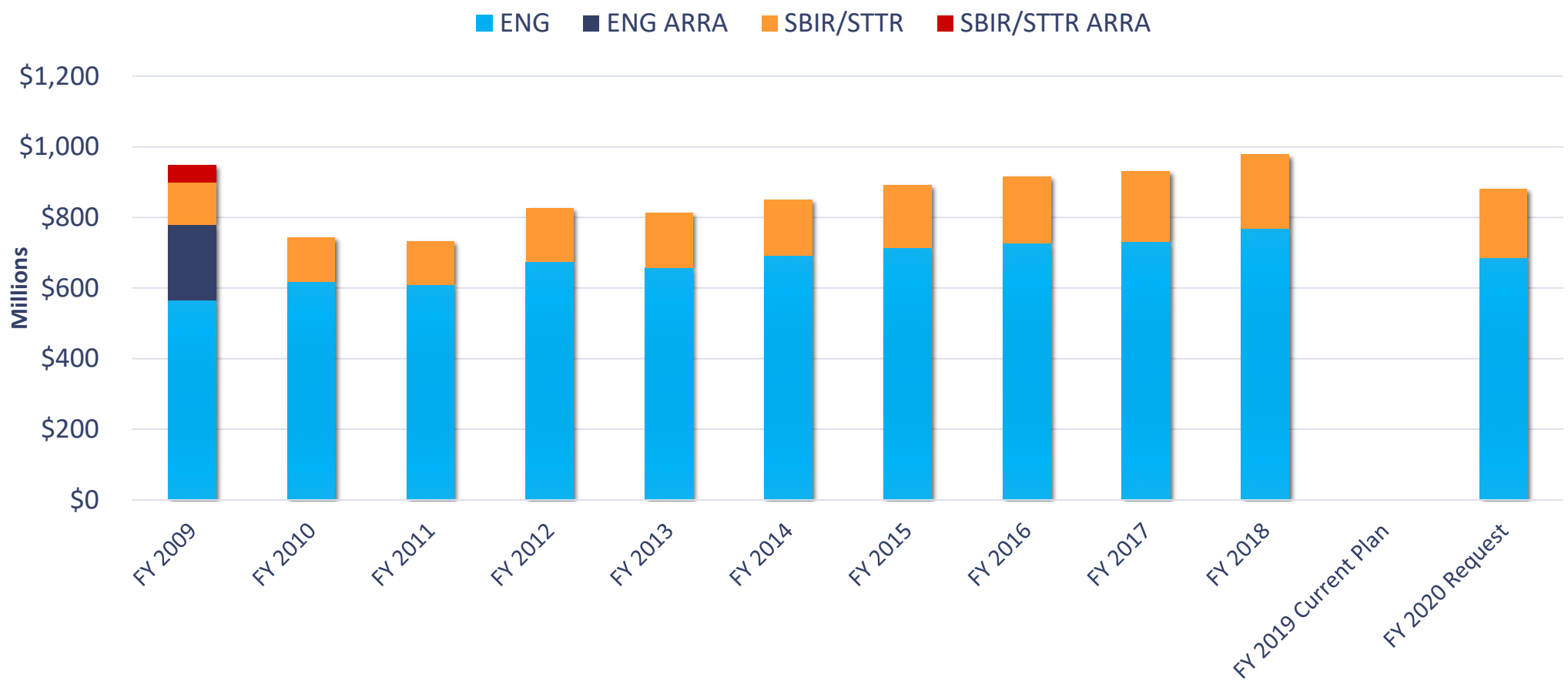
Vision: ENG will be a global leader in identifying and catalyzing fundamental engineering research, innovation, and education.

Mission: To enable the engineering and scientific communities to advance the frontiers of engineering research, innovation, and education, in partnership with the engineering community, and in service to society and the nation.

NSF Directorate for Engineering

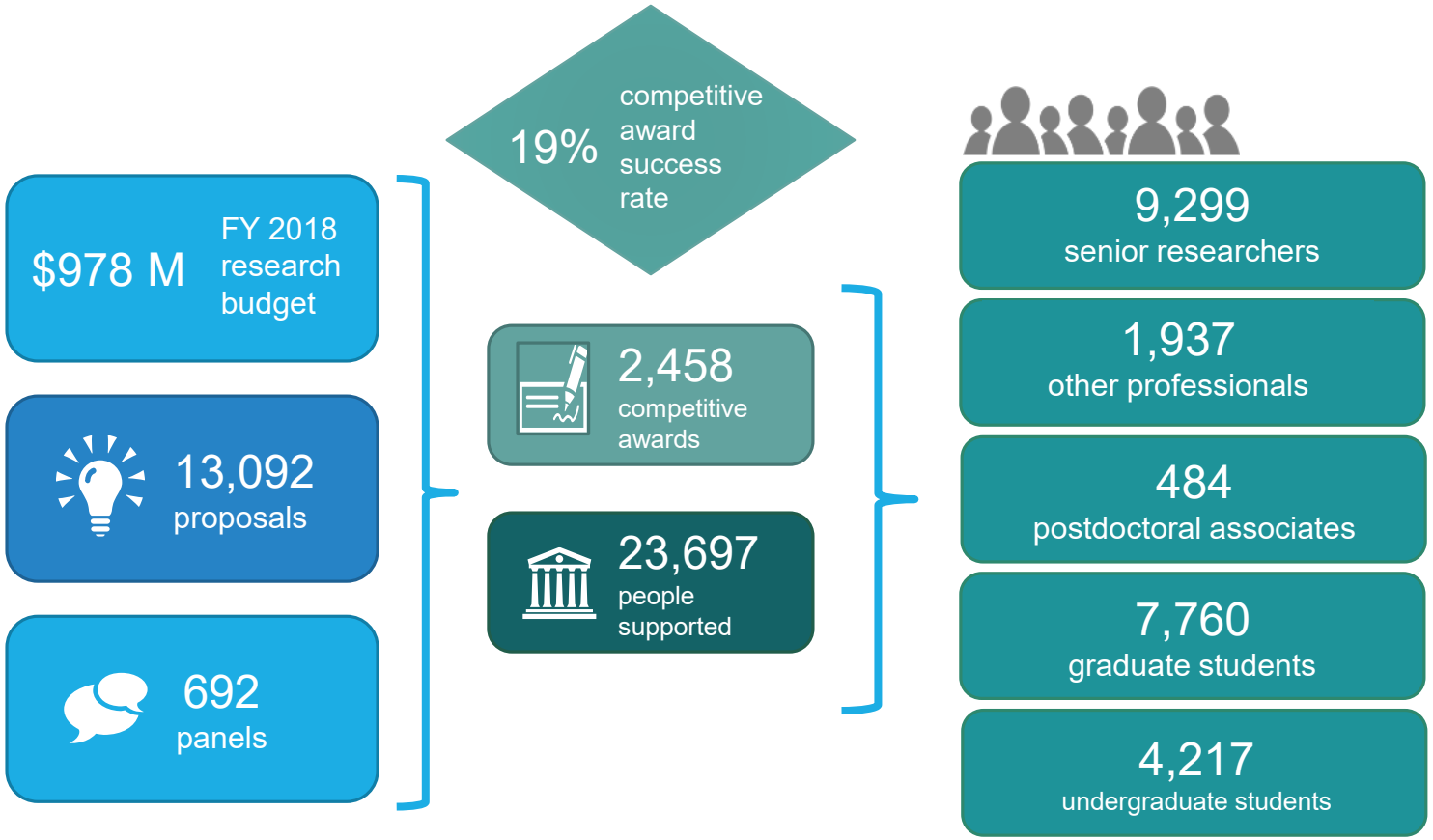


ENG and SBIR/STTR R&RA Budgets



FY Appropriated Funds

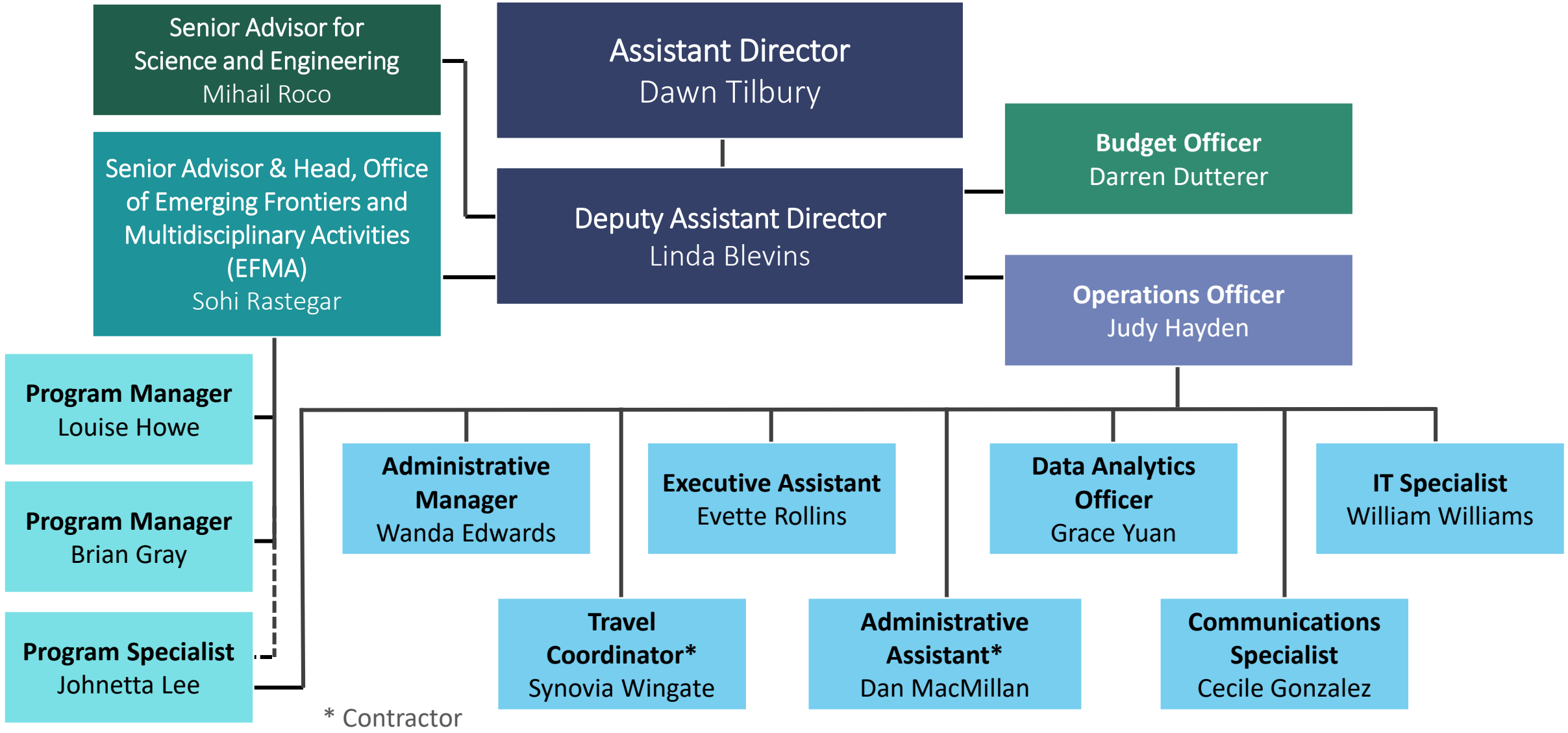
ENG by the Numbers: FY 2018



NSF ENG Strategy

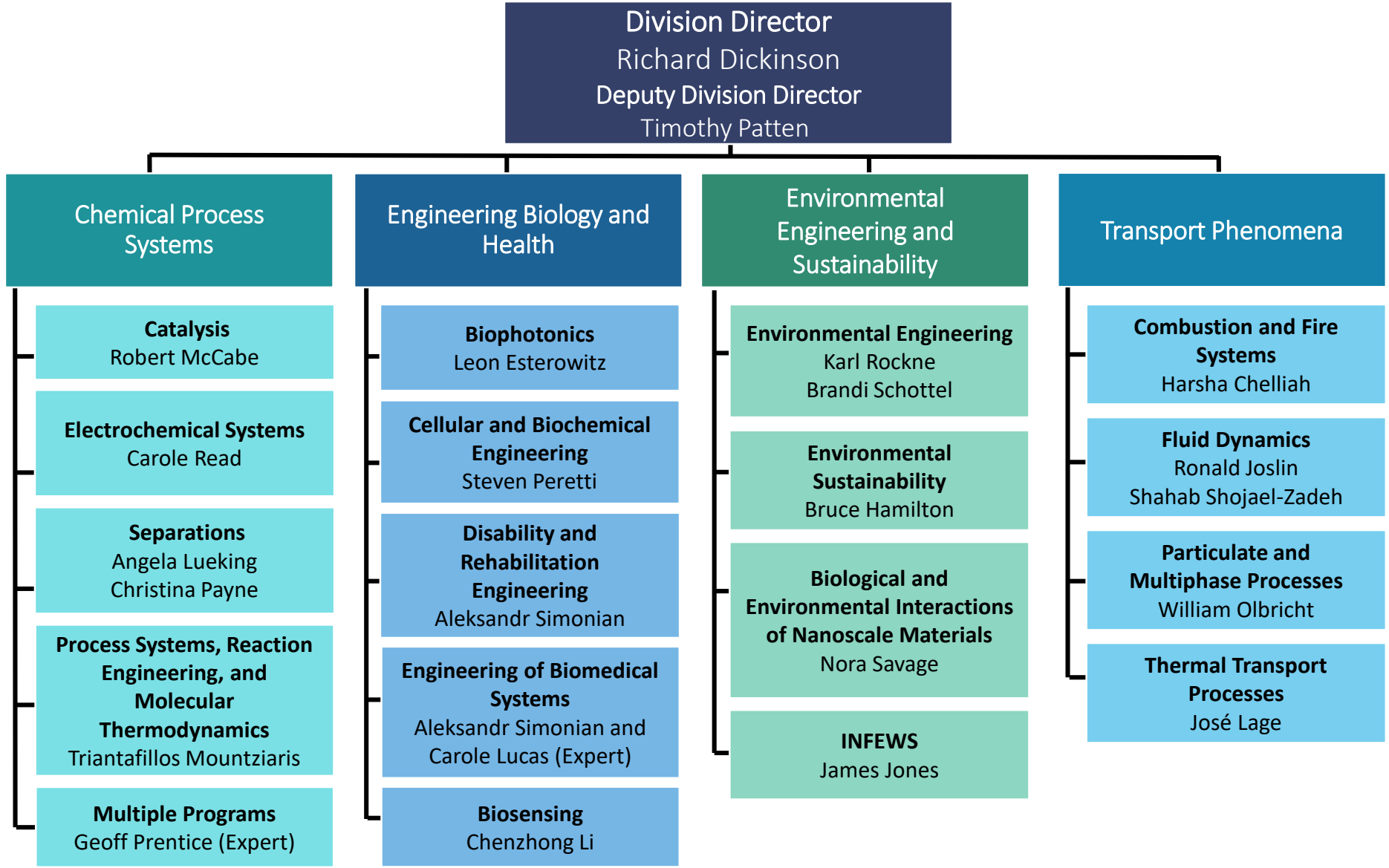
- Attract, stimulate, catalyze and challenge research communities to think big, enable transformational advances, and expand national innovation capacity
- Portfolio balance between fundamental, applied and translational as well as small, medium and large projects
- New approaches to address engineering education challenges
- Collaborate and partner within and outside NSF to maximize opportunity for the engineering research and education community to address major national priorities

ENG Office of the Assistant Director



* Contractor

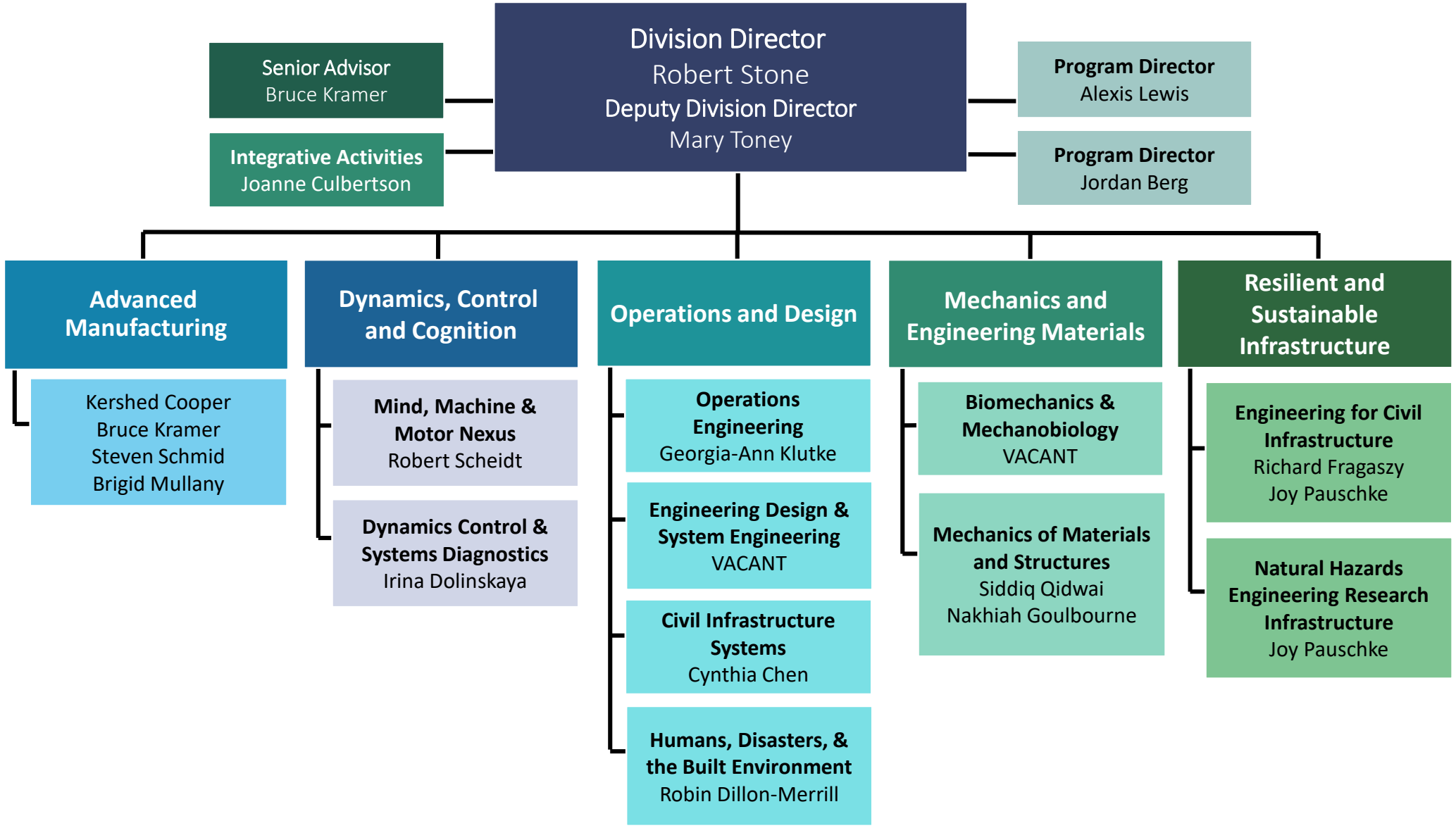
Chemical, Bioengineering, Environmental, and Transport Systems (CBET)



CBET Areas of Interest

- **Chemical process systems**
  Seeks innovations in catalytic design, reaction engineering, multiphase chemical separations processes, molecular thermodynamics, process control and design, and sustainable energy conversion.
- **Engineering biology and health**
  Supports engineering research to improve human health and the understanding of biological and physiological systems.
- **Environmental engineering and sustainability**
  Seek projects that identify, monitor, and mitigate impacts of human activities, advance resource and energy conservation and recovery, … , and support cost-effective solutions to protect ecological and human health.
- **Transport phenomena**
  Supports single- and multi-phase flow dynamics, particulate, heat and mass transfer, and combustion and fire dynamics.

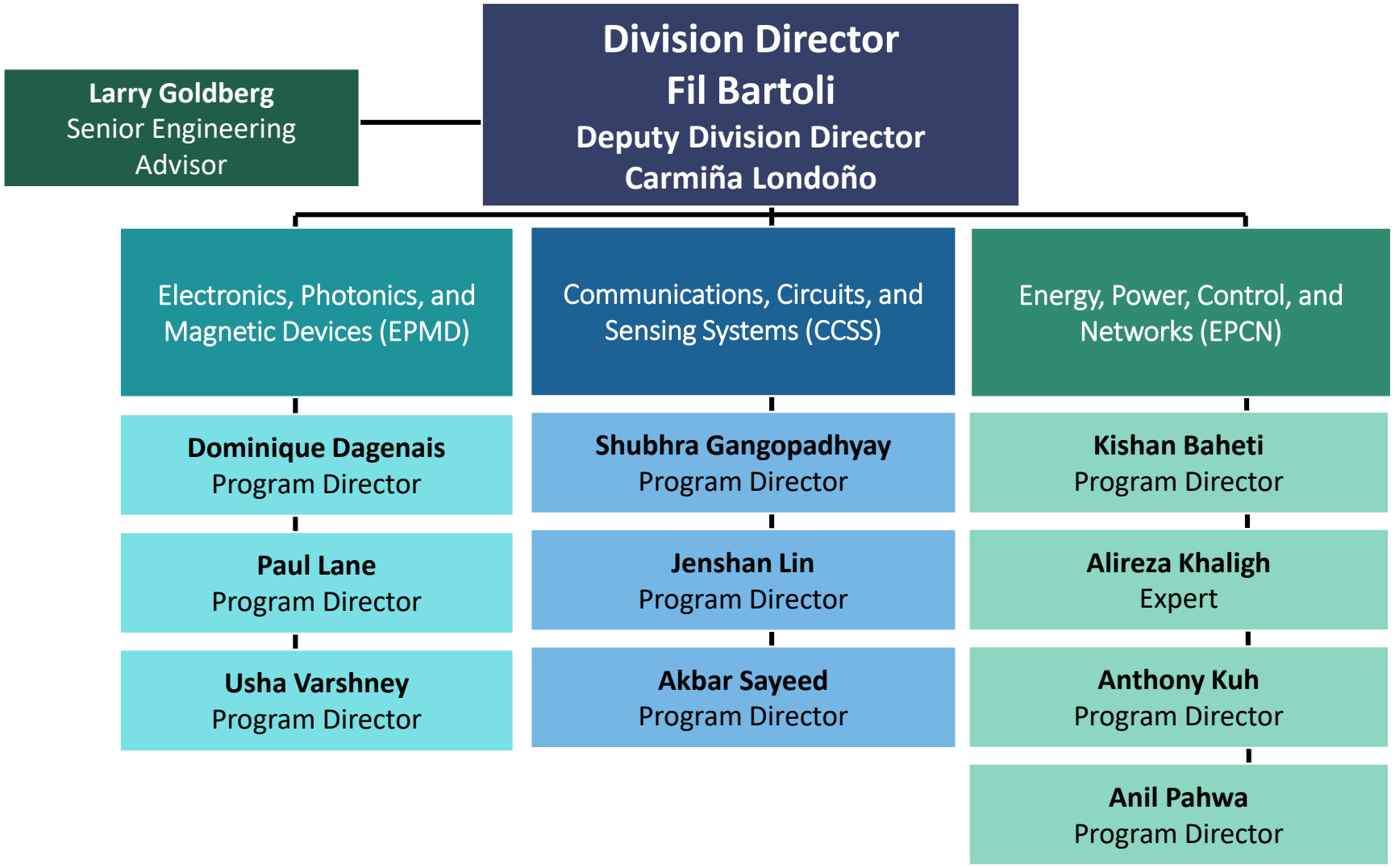
Civil, Mechanical and Manufacturing Innovation (CMMI)



CMMI Areas of Interest

- **Advanced Manufacturing**
  transformative advances in manufacturing and materials processing, with emphases on efficiency, economy, sustainability and scalability
- **Dynamic, Control, and Cognition**
  modeling, analysis, diagnostics, measurement, and control of dynamical systems, including but not limited to those involving physical interaction between human and embodied artificial intelligences
- **Mechanics and Engineering Materials**
  understanding the behavior and use of materials in engineered and natural systems
- **Resilient and Sustainable Infrastructures**
  innovation to advance resilience and sustainability of civil infrastructure and distributed infrastructure networks
- **Operations and Design**
  decision-making aspects of engineering, including design, control, optimization and systems science

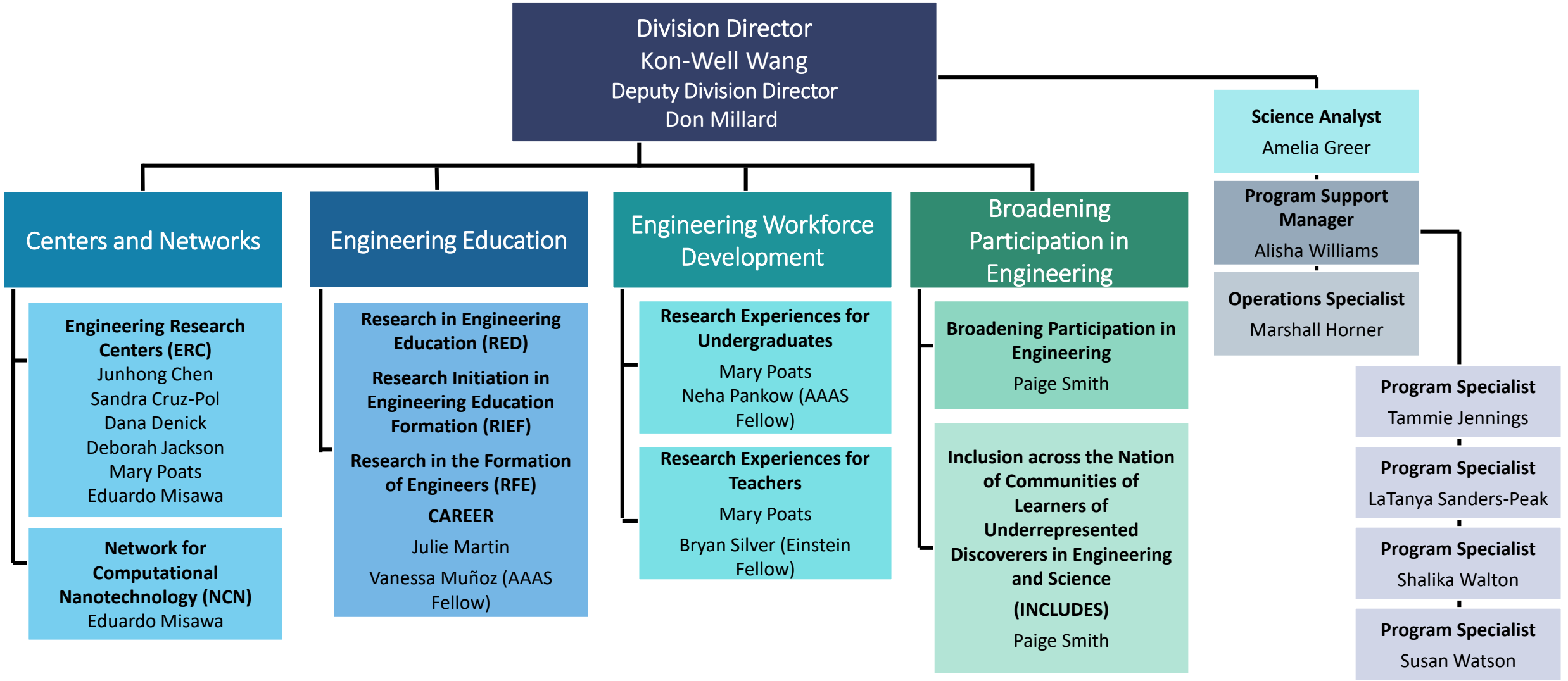
Electrical, Communications, and Cyber Systems (ECCS)



ECCS Priorities

- **Address fundamental research issues at the nano, micro, and macro scales underlying device and component technologies for energy and power, controls, networks, communications, computation, and sensing applications**
- **Support research on systems and networks for advanced engineering applications**
- **Support education of a diverse workforce in electrical and computer engineering to meet the technological challenges of a 21st century global economy**

Engineering Education and Centers (EEC)



Engineering Centers and Networks

- **Large-scale research, education, broadening participation and workforce development investments in ENG**
- **Supports collaboration with industry and other stakeholders to promote innovative research and education**
- **Engineering Research Centers (ERC)**
  - Four generations (70+ centers) since 1985 (a new solicitation was just released this week: NSF 19-503)
- **Network for Computational Nanotechnology**
  - Cyber-resource for nanotechnology theory, modeling and simulation
  - nanoHUB.org gateway for nanotechnology research and education
  - > 180k users globally

Industrial Innovations and Partnerships (IIP)

Division Director
Andrea Belz

Deputy Division Director
Gracie Narcho

Program Director
GOALI / INTERN / IUCRC
Prakash Balan

Program Director
I-Corps
Andre Marshall

Program Director
PFI
Jesus Soriano

Vacant

Program Director
IUCRC
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I-Corps
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SBIR / STTR
Henry Ahn

Program Director
SBIR / STTR
Peter Atherton

Program Director
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Anna Brady-Estevez

Program Director
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Nancy Kamei

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SBIR / STTR
Steve Konsek

Program Director
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Rajesh Mehta

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Linda Molnar

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Murali Nair

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Ruth Shuman

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SBIR / STTR
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Staff Associate
Kerstin Mukerji

Operations Specialist
Greg Misiorek

Communications Specialist
Kelly Monterroso

Science Analyst
Yuen Lau

Program Support Manager
Mary Konjevoda

Program Analyst
Miki Templeton

Program Analyst
Kevin Brogan

Contract Staff
Amanda Morris

Division of Industrial Innovation and Partnerships (IIP)

- **Invests in high-tech small businesses and collaborations between academia and industry to transform discoveries into innovative commercial technologies with societal benefits.**

Partnerships for Innovation

INTERN & GOALI

Industry-University Cooperative Research Centers (IUCRC)

Funding Opportunities in ENG

Funding Mechanisms

- **Core/Unsolicited:** Two to four years; Individual/small collaborative teams: funds increase for collaboration
- **Solicitations:** Small to large funding size; multiple divisions/directorates can be involved
  - Special research call – LEAP-HI, DMREF, NRI, CPS
  - Early Career – CAREER
  - Instrumentation – MRI
  - Centers – ERC, STC, IUCRC
- **Workshops/Conferences:** Not a vehicle to fund a get-together of friends and like-minded people

ENG Divisions Remove Deadlines for Core Programs

New, unsolicited proposals may be submitted at any time:

- Change effective *August 15th, 2018* for CBET, CMMI, ECCS, and EEC Divisions.
- Core Programs only. Solicitations and CAREER still have deadlines.
- Investigators have a one year moratorium on submitting a proposal substantively similar to a declined proposal.

Removal of Deadlines for Core ENG Program: https://www.nsf.gov/pubs/2018/nsf18082/nsf18082.jsp

FAQ on Removal of Deadline: https://www.nsf.gov/pubs/2018/nsf18083/nsf18083.jsp

Cont'd

By accepting proposals at any time ENG is affording PIs the opportunity to:

- think more creatively about proposed work;
- build strong collaborations;
- converse with Program Directors; and
- carefully prepare proposals.

It is our hope that the elimination of deadlines will reduce the burden on institutions and the community.

Now You Have More Time! What Should You Consider?

Be bold in your ideas! Propose work that

- Advances your field in leaps and bounds, and
- Has broad societal impacts.

Ask for the funds you need to complete your work!
For example:

- Livable graduate research assistant wage,
- Funding for summer salary,
- Small to mid-scale equipment funding, and
- Duration of funding.

NSF's 10 Big Ideas | Research Ideas

Harnessing the Data Revolution

The Future of Work at the Human-Technology Frontier

Navigating the New Arctic

The Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

Windows on the Universe: The Era of Multi-messenger Astrophysics

NSF's 10 Big Ideas | Enabling Ideas

Growing Convergence Research at NSF

NSF 2026: Seeding Innovation

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

Mid-scale Research Infrastructure

Emerging Frontiers in Research and Innovation (EFRI)

Supports high-risk, high-reward opportunities that:

- Are potentially transformative
- Address a national need or grand challenge
- Involve multi- or inter-disciplinary research

EFRI FY19 Topics (Solicitation NSF 19-502)

- CEE: Chromatin and Epigenetic Engineering
- C3 SoRo: Continuum, Compliant, and Configurable Soft Robotics Engineering

Recent topic areas:

- Flexible Bioelectronics Systems (BioFlex)
- Origami Design for the Integration of Self-assembling Systems for Engineering Innovation (ODISSEI)
- Advancing Communication Quantum Information Research in Engineering (ACQUIRE)
- New Light and Acoustic Wave Propagation: Breaking Reciprocity and Time-Reversal Symmetry (NewLAW)

4-year awards at ~$500K per year

Topics for FY 2020: Distributed Chemical Manufacturing and **Engineering the Elimination of End-of-Life Plastics**

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Questions & Answers

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