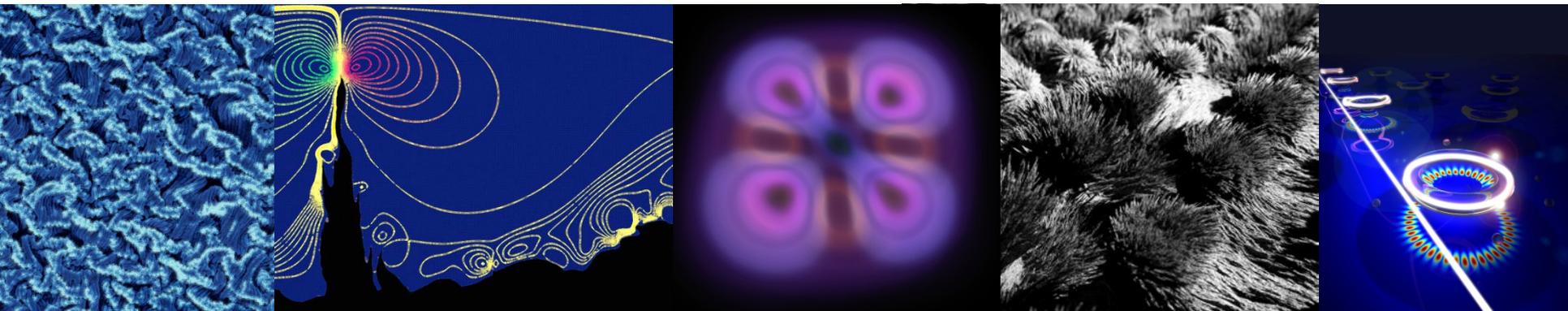
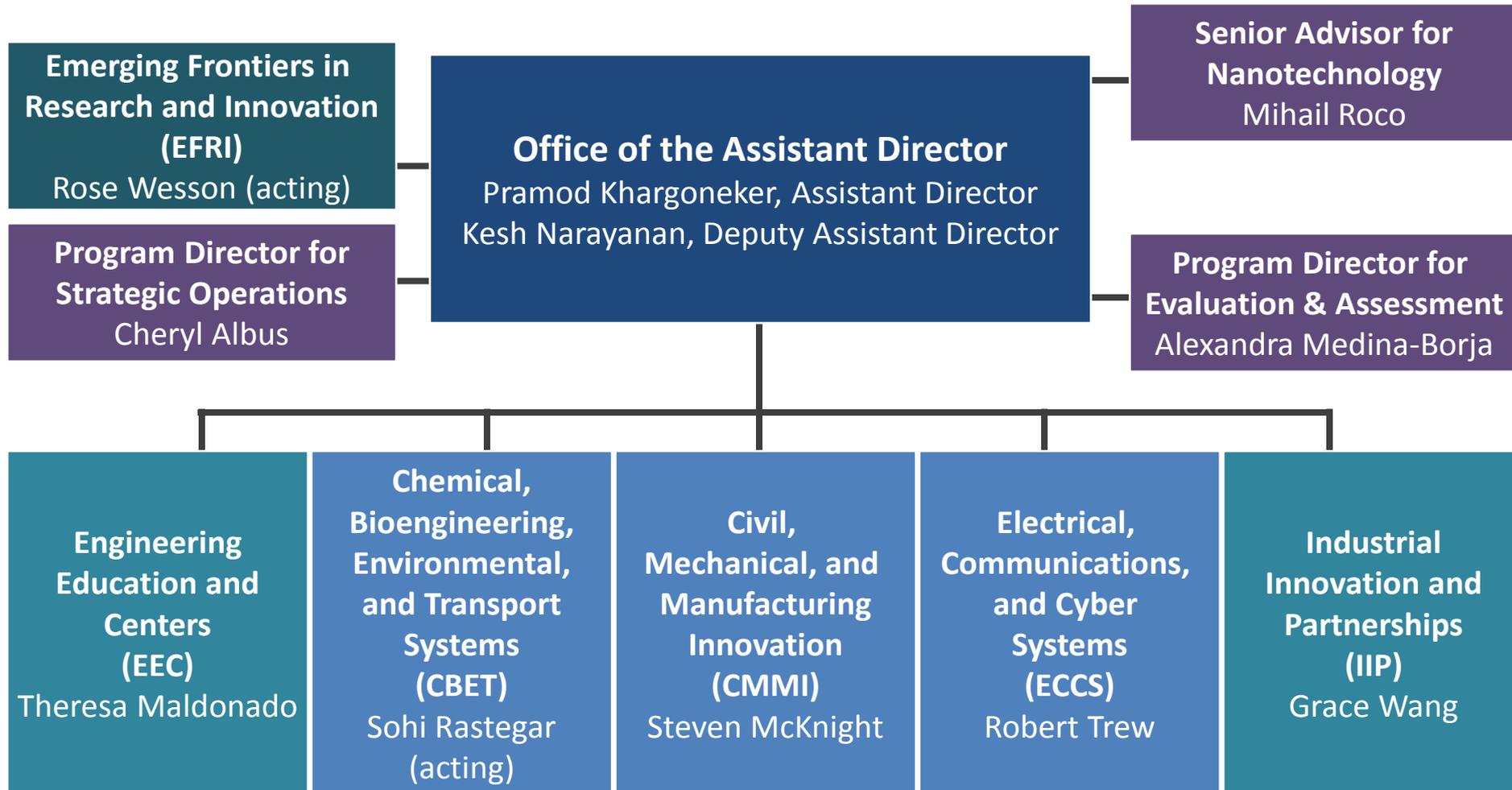


Directorate for Engineering

Cheryl F. Albus
Office of the Assistant Director
Director for Operations



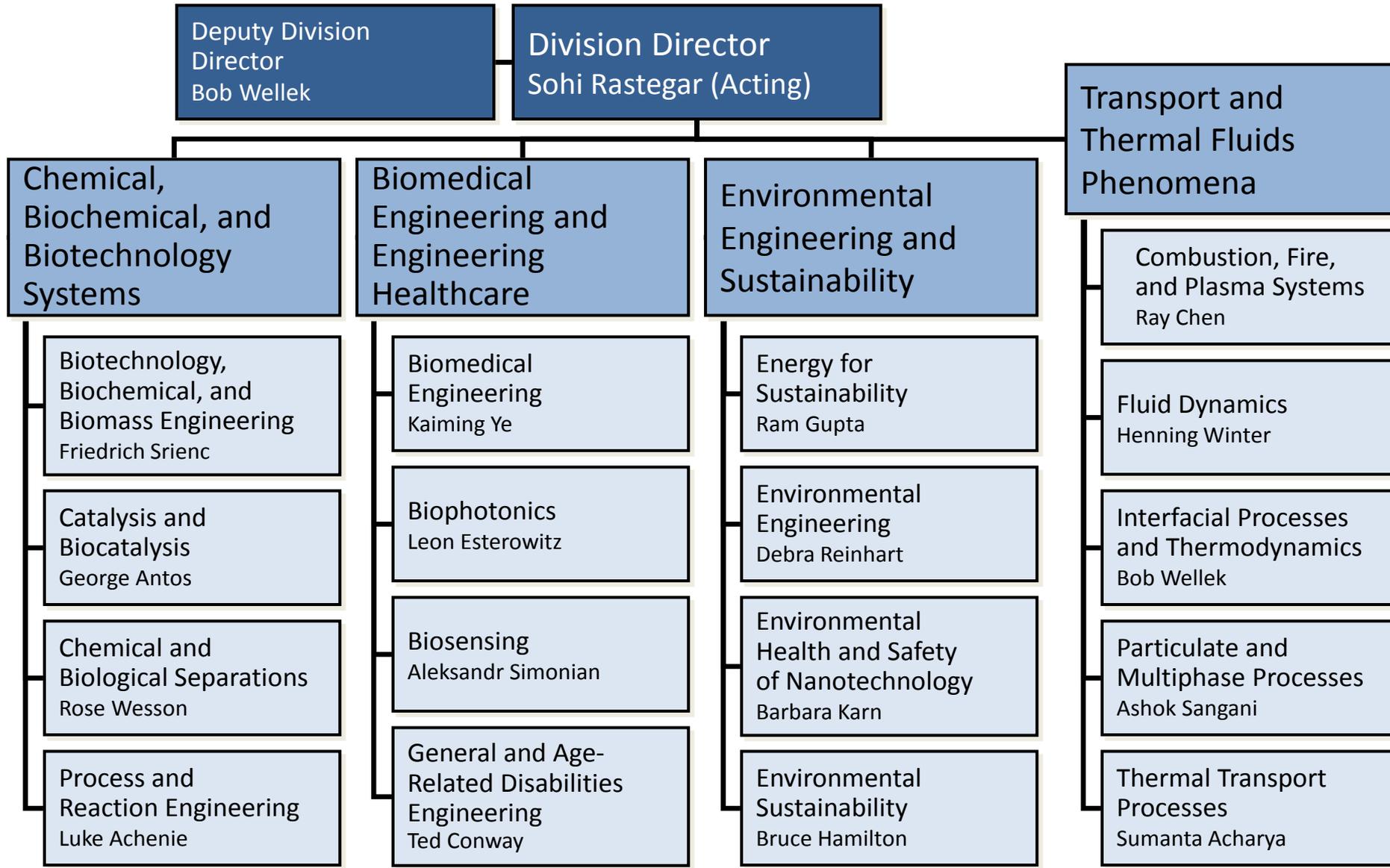
NSF Directorate for Engineering (ENG)



ENG 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

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

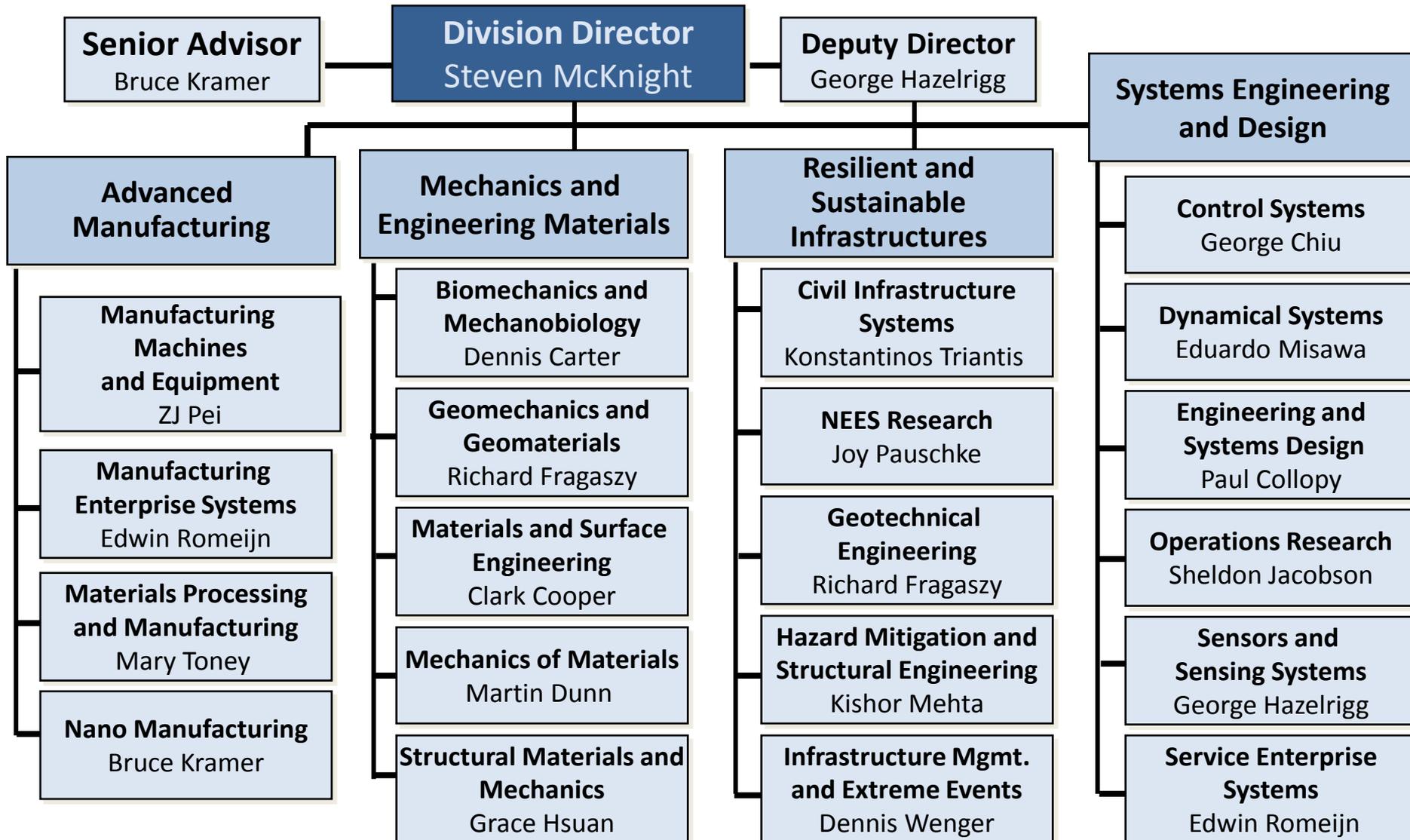


CBET Areas of Interest

- **Chemical, biochemical, and biotechnology:** processing and manufacture of products by effectively utilizing chemical and renewable resources,
- **Biomedical engineering and engineering healthcare:** to integrate engineering and life science to solve biomedical problems
- **Environmental engineering and sustainability:** to reduce adverse effects of solid, liquid, and gaseous discharges into land, water, and air that result from human activity and impair the ecological value of those resources
- **Transport and thermal fluids phenomena:** thermal, mass, and momentum transport that enable new technological solutions to understand pressing issues in energy, environment, manufacturing, health care, and other fields

ONE submission deadline per year: Sept. or Feb., depending on the program

Civil, Mechanical, and Manufacturing Innovation (CMMI)

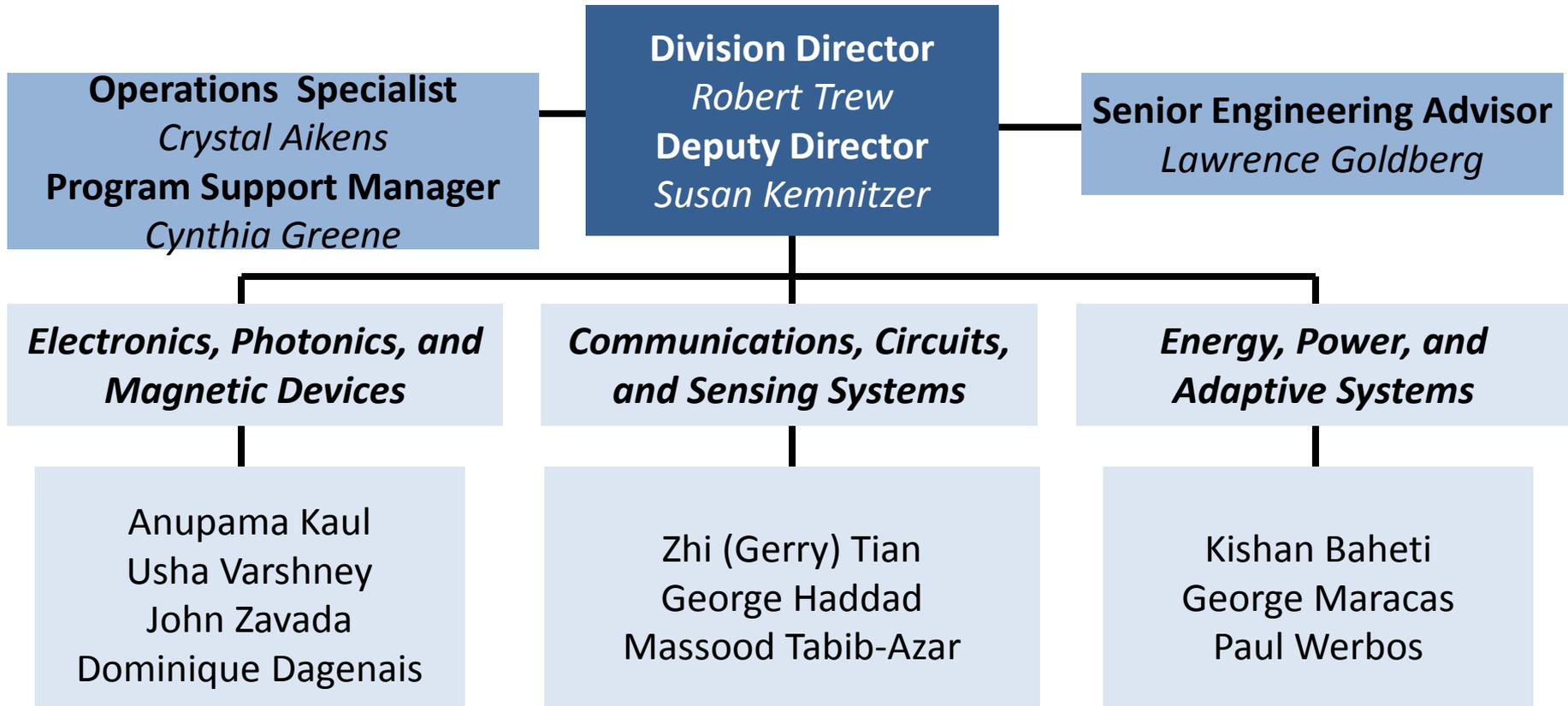


CMMI Areas of Interest

- **Advanced manufacturing:** transformative advances in manufacturing and building technologies, with emphases on efficiency, economy, and sustainability
- **Mechanics and engineering materials:** advances in the transformation and use of engineering materials efficiently, economically, and sustainably
- **Resilient and sustainable infrastructures:** to advance fundamental knowledge and innovation for resilient and sustainable civil infrastructure and distributed infrastructure networks
- **Systems engineering and design:** decision-making aspects of engineering, including design, control, and optimization

Two submission deadlines each year: Oct. 1 and Feb. 15

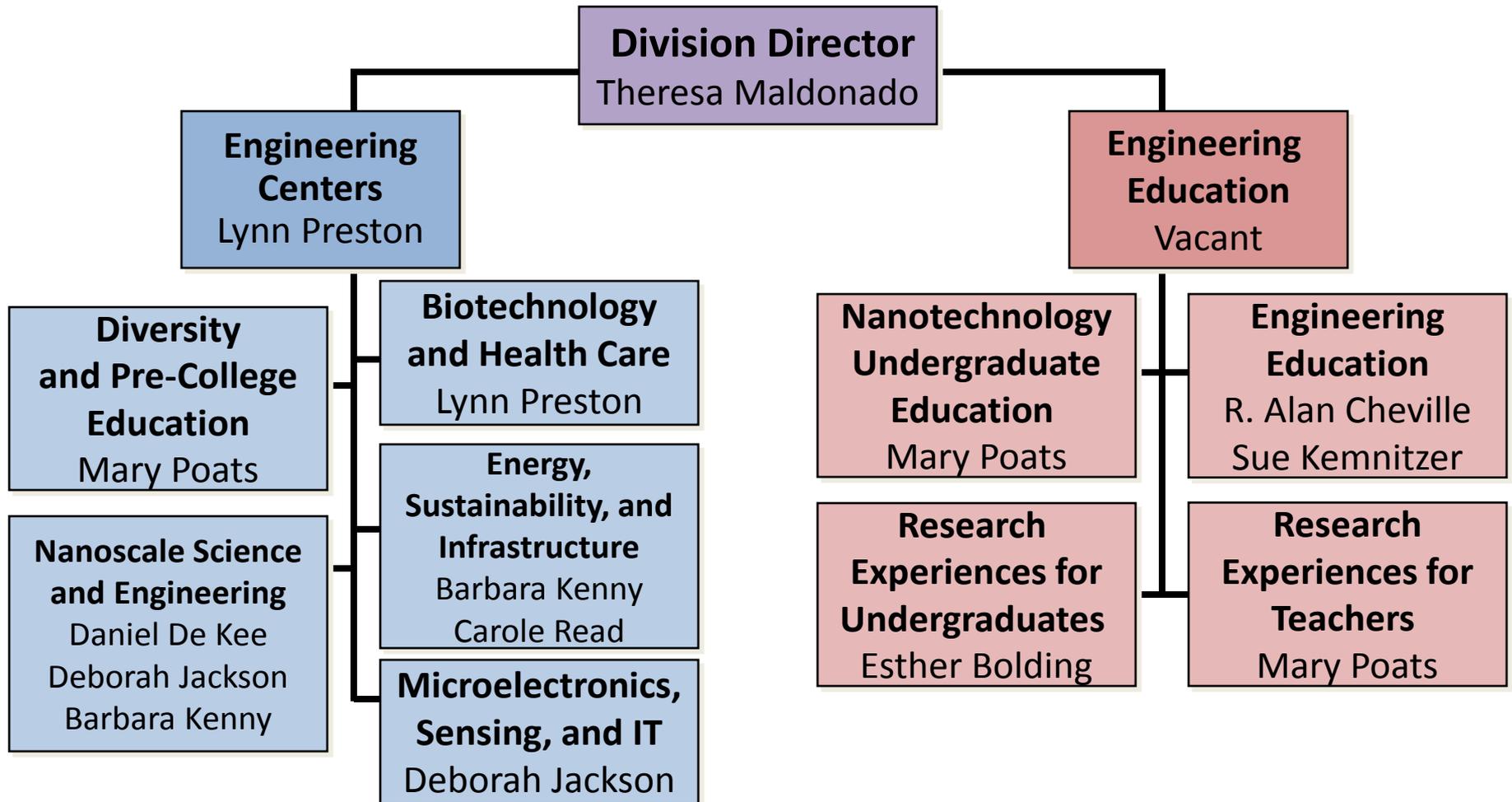
Electrical, Communications, and Cyber Systems (ECCS)



ECCS Areas of Interest

- Nano, micro, and macro scales underlying device and component technologies, energy and power, controls, networks, communications, computation, sensing and cyber systems
- Integration of systems principles in complex engineering systems and networks for a variety of applications areas
- Education of a diverse workforce to meet the technological challenges of a 21st century global economy

Engineering Education and Centers (EEC)



Engineering Research Centers

- Supports collaboration with industry to promote innovative research and education
- Engineering Research Centers
 - 17 in operation
 - Funding for 10 years
 - 2-year process from solicitation to funding
- Nanoscale Science & Engineering Centers
 - First centers graduated in 2011
 - 2007 solicitation established two Centers for the Environmental Implications of Nanotechnology

Engineering Education Research

- Seeks to enable a system of engineering education, equally open to all members of society, that dynamically and rapidly adapts to meet changing needs. Research areas include:
 - Increasing our understanding of how engineering students learn and the capacity that supports such discovery
 - Understanding how to increase the diffusion and impact of engineering education research
 - Understanding engineering education in broader frameworks such as sustainability
 - Diversifying pathways to and through engineering degree programs

Research Initiation Grants in Engineering Education

- Enables engineering faculty who are renowned for teaching, mentoring, or leading educational reform efforts to initiate collaborations with colleagues in the learning and cognitive sciences to address difficult, boundary-spanning problems in engineering education
- ~\$3M for 20 awards
- Proposals due the last Thursday in March (3/28/13)

Broadening Participation Research Initiation Grants in Engineering (BRIGE)

- Funding opportunity intended to increase the diversity of researchers through research program support early in their careers
- Encourages support of under-represented groups, engineers at minority serving institutions, and persons with disabilities
- 25–30 awards (pending availability of funds)
- Up to \$175,000 over two years
- New solicitation is NSF 13-534 (April 29, 2013)

Emerging Frontiers in Research and Innovation Office



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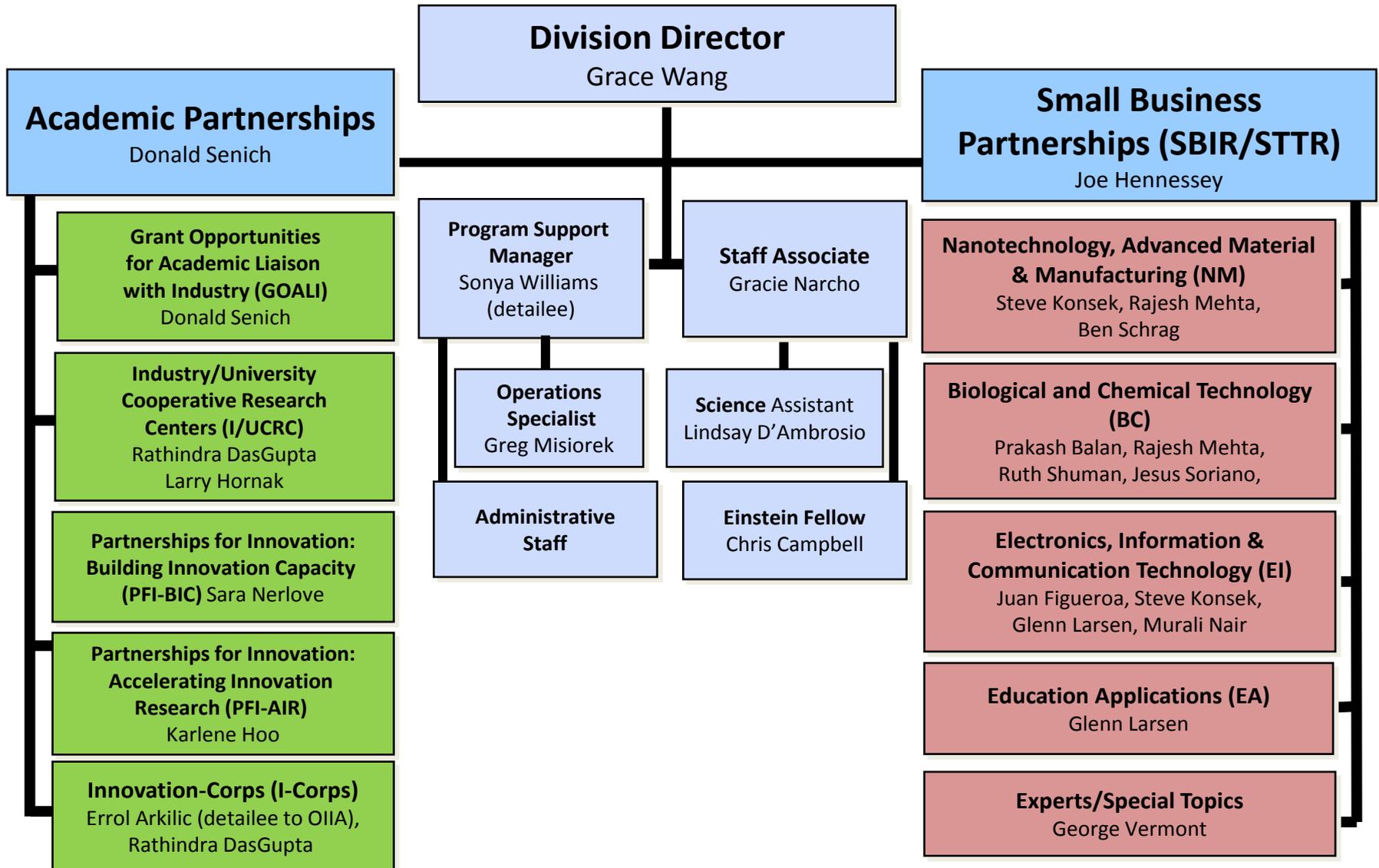
Shannon Dunphy ,
Science Assistant
703-292-8300

EFRI- In One Slide

- **MANDATE** - Serve a critical role in helping the Directorate for Engineering focus on important emerging areas in a timely manner.
 - **COMMUNITY DRIVEN** - Engages the research community (through DCL) and ENG/NSF PDs to identify and fund a portfolio of projects in strategic emerging interdisciplinary areas that may not be supported with current NSF programs and in which ENG researchers play the leading role.
 - **PTR AND IDR** - Uses PTR (Potentially Transformative / High risk, High reward) and IDR (interdisciplinary) as criteria for project selection
 - **MIDSCALE BUDGET** - It is the main Midscale funding mechanism in ENG (\$2M / 4-year projects)
- **EFRI TOPICS:**

FY 2007	Auto-Reconfigurable Engineered Systems (ARES) Cellular and Biomolecular Engineering (CBE)
FY 2008	Cognitive Optimization (COPN) Resilient and Sustainable Infrastructures (RESIN)
FY 2009	Biosensing and Bioactuation (BSBA) Hydrocarbon from Biomass (HyBi)
FY 2010	Science in Energy and Environmental Design (SEED) Renewable Energy Storage (RESTOR)
FY 2011	Engineering Multicellular and Interkingdom Signaling (MIKS); Mind, Machines, and Motor Control (M3C)
FY '12,'13	Flexible Bioelectronics Systems (BioFlex), Origami Design for the Integration Of Self-assembling Systems For Engineering Innovation (ODISSEI); Photosynthetic Biorefineries (PSBR)
- **TOPIC LEADERS** - Program Directors from ENG Divisions in collaboration with PDs from other NSF Directorates and other Federal agencies when appropriate
http://nsf.gov/staff/staff_list.jsp?org=EFRI&from_org=EFRI

Industrial Innovation and Partnerships (IIP)



Grant Opportunities for Academic Liaison with Industry (GOALI)

- Aims to synergize university-industry partnerships and fund transformative research that industry would not normally fund
- Mechanism:
 - Faculty and students in industry
 - Industry scientists and engineers in academe
 - Industry-University Collaborative Research (I/UCRC) Projects
- Criteria:
 - Impact/relevance of successful research
 - Strong industrial co-PI
 - Resources considered (Time, facilities, materials and intellectual property)
- GOALI Solicitation: NSF 12-513

Industry/University Cooperative Research Center (I/UCRC) Program

- Promotes long-term partnerships among industry, academe, and government
- Centers are catalyzed by a small investment from NSF and are primarily supported by industry center members during their development and evolution
- ~\$10M for 2-8 full center awards (\$55-80K/year for up to 5 years) and 4-12 planning grant awards (\$10K for 1 year)
- Two windows per year:
Letters of Intent due in Jan. and June;
Full proposals due in March and Sept.

Partnerships for Innovation: **Building Innovation Capacity (BIC)**

Goals

- To build the innovation capacity of the participants (academe and business)
- To facilitate the viability of the small technology-based businesses
- To educate students in building innovation capacity

Core

- Lead: academic institution
- A minimum of 2 small technology-based businesses
- \$600k/2 years; LOI mandatory



Partnerships for Innovation (PFI)

Accelerating Innovation Research (AIR)

TECHNOLOGY TRANSLATION Option

Goals

- To complete the research that will result in a proof-of-concept and prototype that addresses real-world constraints
- To move existing research discoveries towards commercial realities
- To create an entrepreneurial culture
- Clear identification of technology gaps that will be filled
- Justification that a fully functioning prototype will be an output at the end of the award duration

Core

- Single PI or small groups of faculty
- Current or 4-years prior to solicitation due date NSF research award recipient
- \$150K/18 months

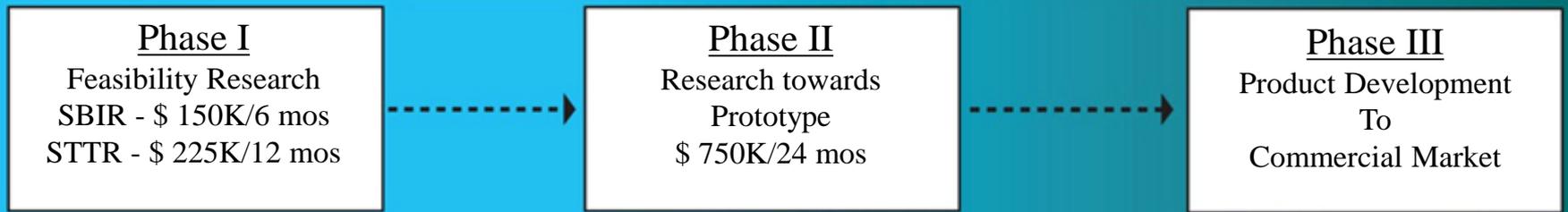


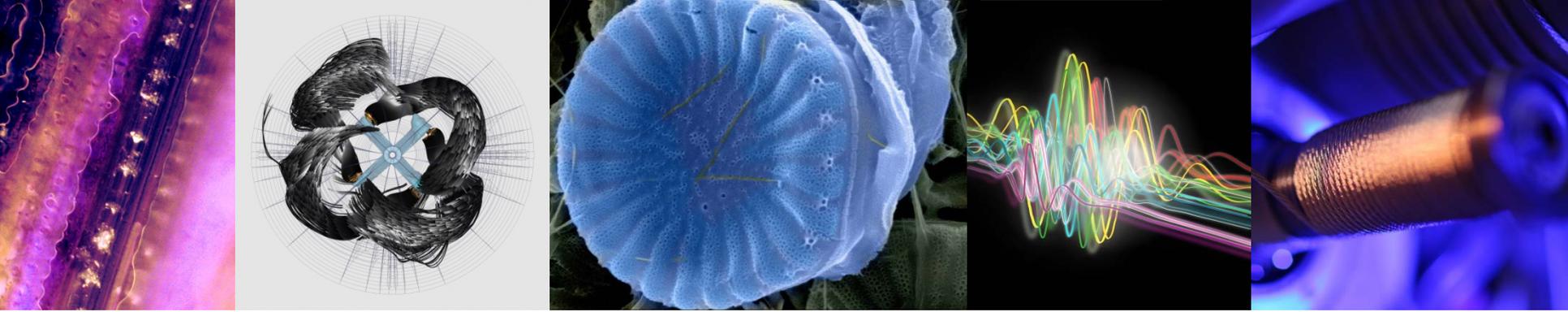
Innovation Corps (I-Corps)

- NSF-Wide, Public-Private partnership to support the development of technologies, products and processes
- Purpose: to leverage NSF investments in research; to support potential transition of technology previously supported by NSF
- Small grants to focus on creating a commercialization roadmap
- Projects are team-based
 - Entrepreneurial Lead (Post-doc or Student)
 - I-Corps Mentor
 - Principal Investigator

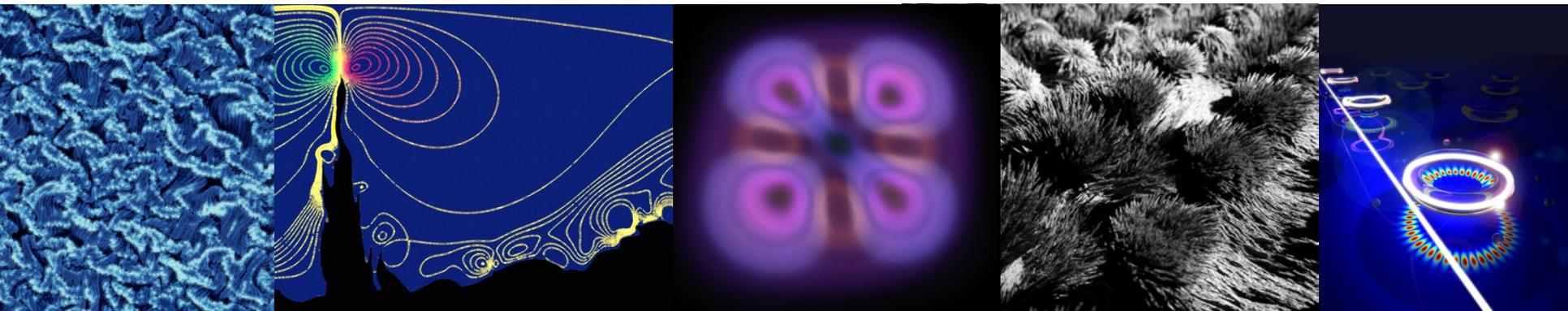


NSF SBIR/STTR Innovation Model





ENG Investments and Crosscutting Programs



CAREER

- Forward-looking program review is led by Pat Farrell, ENG Advisory Committee Chair
- NSF CAREER Coordinating Committee chair is Theresa Maldonado, ENG/EEC Division Director
- CAREER awardees have a new supplement opportunity to collaborate with researchers supported by the European Research Council



European Research Council

Established by the European Commission

Advanced Manufacturing

National initiatives

CMU

- Advanced Manufacturing Partnership
 - National Robotics Initiative
 - Materials Genome Initiative
- National Manufacturing Institutes
 - Pilot institute for the National Network for Manufacturing Innovation (NNMI)



Rolls Royce

Earthquake Engineering Infrastructure and Research

- Re-competition of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES)
 - Hub remains key to research community
 - Overall support remains level
 - Rebalance between facilities and research



Credit: Courtesy NEES

New Sustainability Research Networks (SRNs)

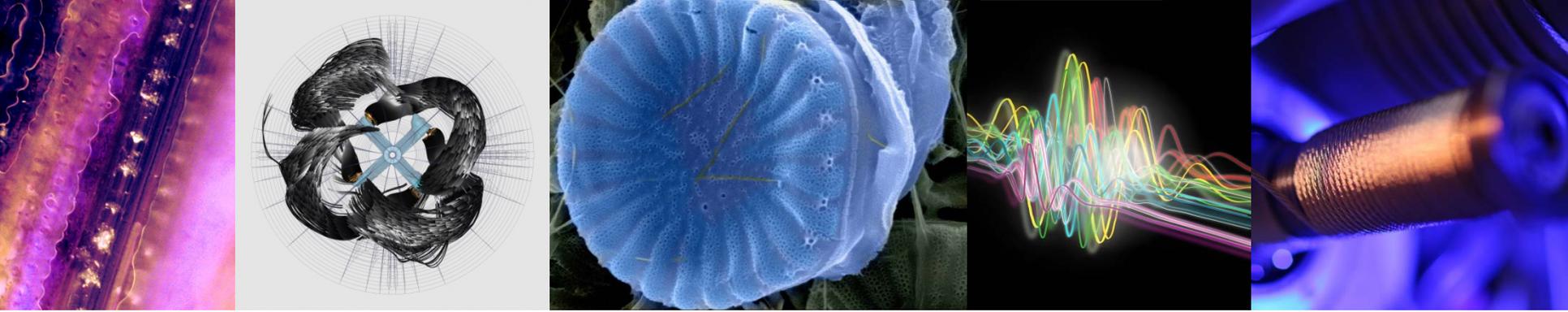
- NSF SEES SRN: Natural Gas Development and its Effects on Air and Water Resources
 - Led by the University of Colorado, Boulder
- NSF SEES SRN: Sustainable Climate Risk Management Strategies
 - Led by Pennsylvania State University



Credit: Alfred Eustes, Colorado School of Mines

One NSF Initiatives

- Cyber-enabled Materials, Manufacturing, and Smart Systems (CEMMSS) and Advanced Manufacturing
- Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)
- Enhancing Access to the Radio Spectrum (EARS)
- Innovation Corps (I-Corps) and the Innovation Ecosystem
- INSPIRE (Integrated NSF Support Promoting Interdisciplinary Research and Education) and Interdisciplinary Research
- Science, Engineering, and Education for Sustainability (SEES) and Clean Energy Technology
- Education and Workforce



Questions

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