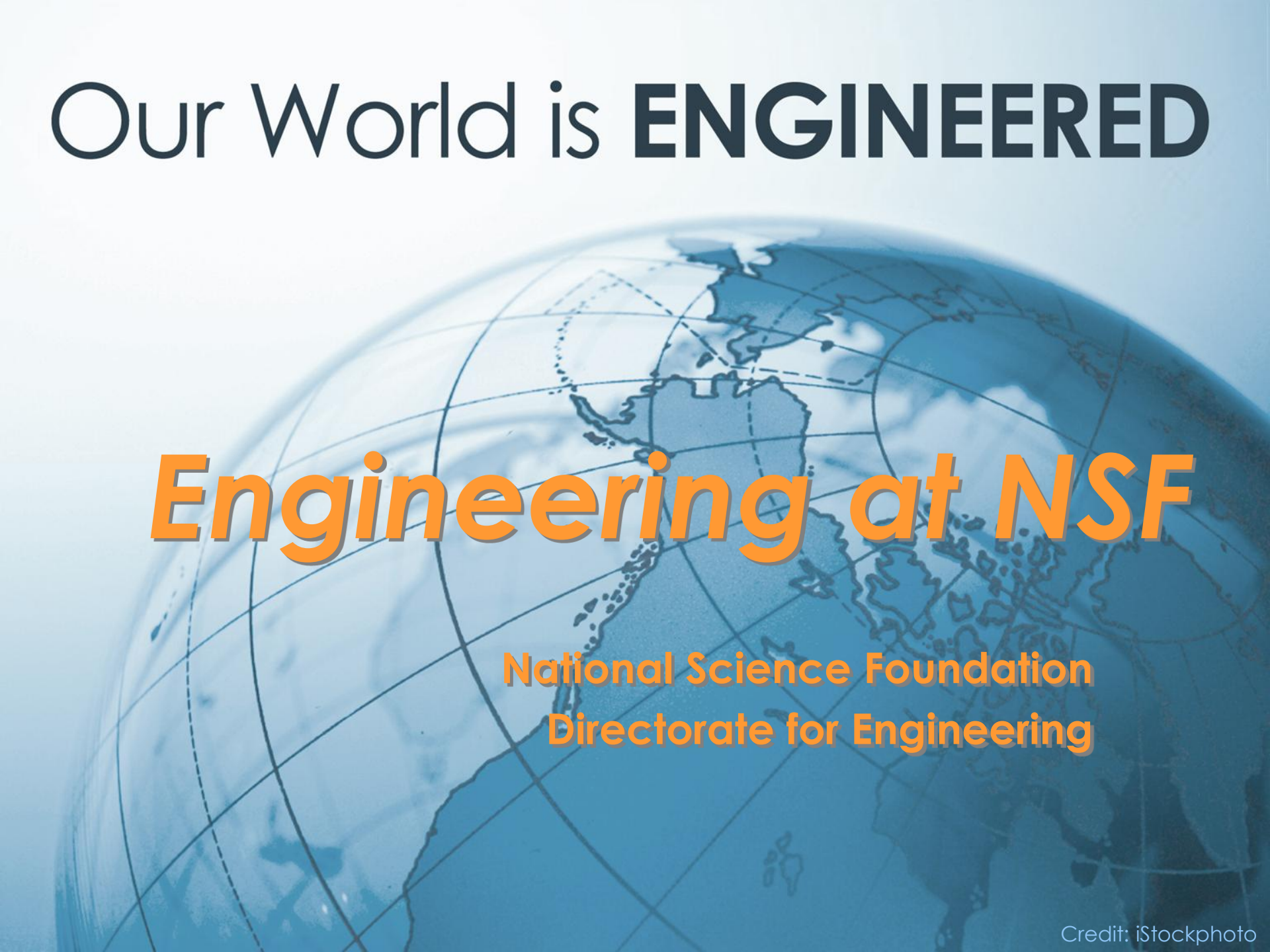

Our World is ENGINEERED
Engineering at NSF
National Science Foundation
Directorate for Engineering
Credit: iStockphoto

Presentation Outline

- Directorate for Engineering (ENG) overview
- Funding opportunities
- Successful proposals
- Resources

ENG Mission and Vision

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

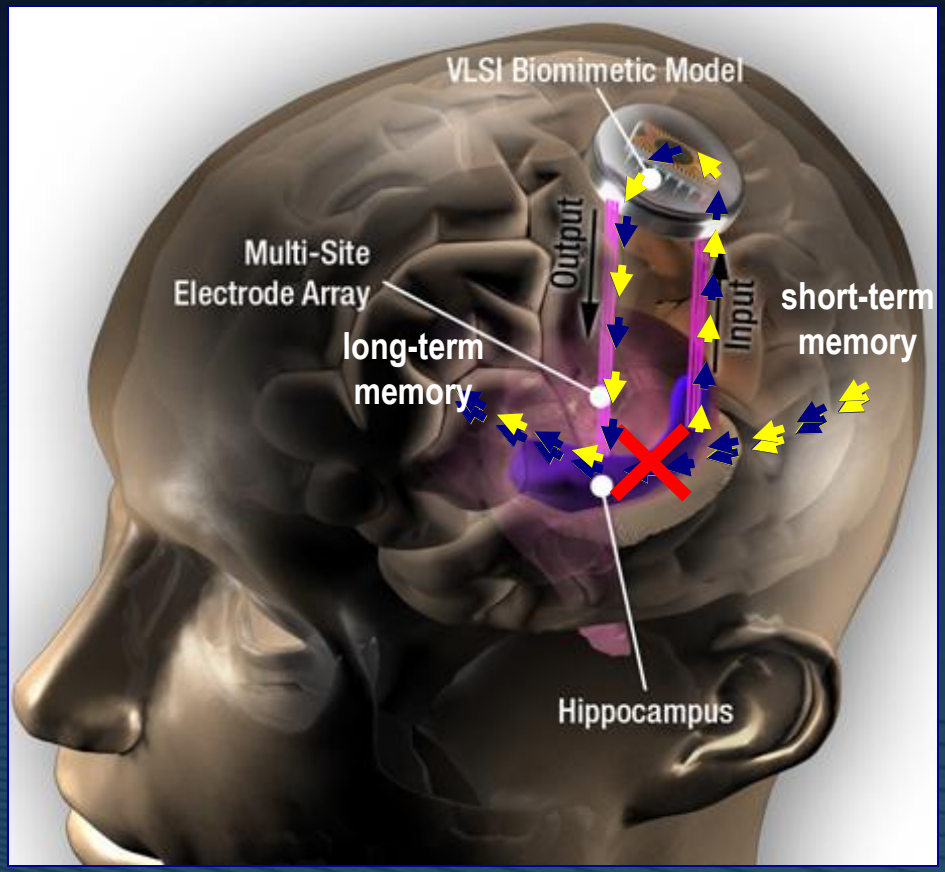
- Vision: ENG will be the global leader in advancing the frontiers of fundamental engineering research, stimulating innovation, and substantially strengthening engineering education.

ENG Research and Education Themes

- Cognitive engineering: Intersection of engineering and cognitive sciences
- Competitive manufacturing and service enterprises
- Complexity in engineered and natural systems
- Energy, water, and the environment
- Systems nanotechnology

Cognitive Engineering

- Invests in improving understanding of the brain and nervous system to enable the engineering of novel systems and machines
- Examples include:
  - Devices that augment the senses
  - Intelligent machines that analyze and adapt

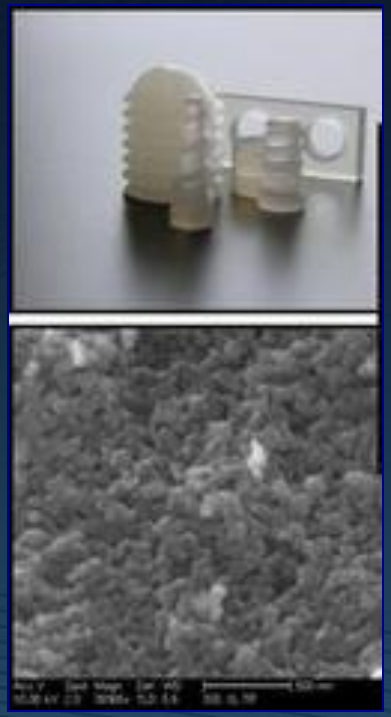


A neural prosthesis restores cognitive function lost due to damage or degenerative disease.

Credit: Biomimetic MicroElectronic Systems ERC, University of Southern California

Competitive Manufacturing and Service Enterprises

- Enables research to catalyze multiscale manufacturing, from fundamental metrology through atomic-scale control of raw materials
- Examples include:
  - Developing quality-engineered nanomaterials in necessary quantities
  - Achieving perfect atomic- and molecular-scale manufacturing



Nanoparticles compose a lightweight biocompatible material for bone implants. *Groza, 0523063.*

Complexity in Engineered and Natural Systems

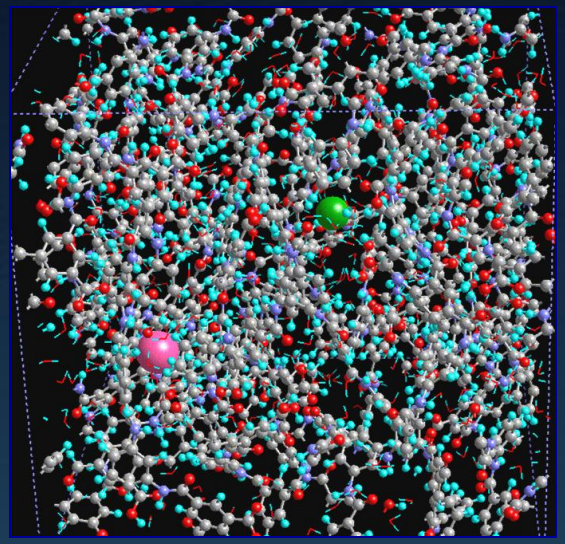
- Addresses unifying principles that enable modeling, prediction, and control of emergent behavior
- Examples include:
  - Improving structural performance during disasters through advanced materials
  - Advancing quantum information processing
  - Making infrastructure more resilient and sustainable

Design of sustainable distributed energy systems relies on modeling diverse waveforms.

Credit (T to B): Microsoft; Computational Science & Engineering, LLC

Energy, Water, and the Environment

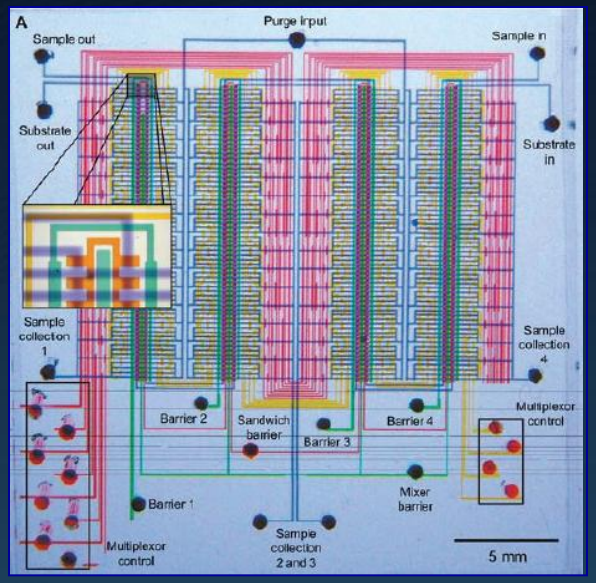
- Supports breakthroughs essential to the provision of energy and water in an environmentally sustainable and secure manner.
- Examples include:
  - Increasing the use of alternative energy sources through research in materials
  - Developing quantitative understanding of energy–environment interactions (including water)



Advanced water purification begins with understanding how ions in water interact with membranes. This dynamic computer simulation shows sodium (pink) and chlorine (green) ions inside a polyamide membrane. *Shannon, 0120978.*

Systems Nanotechnology

- Supports fundamental research that leads to the development of active and complex nanosystems and their integration with biology, energy, and other fields
- Examples include:
  - Developing high-specificity sensors for national security
  - Developing tools to move into the 3rd dimension and into time resolutions of chemical reactions



Integrated circuits that are smaller and faster are possible with microfluidics systems built from or incorporating nanocomponents. *Ferreira, 0328162.*

Funding Opportunities

Credit: Top Row: John C. Phillips photo/ASU Research Magazine; Microsoft; Microsoft; Microsoft; Microsoft; Microsoft; Microsoft. Middle Row: Microsoft; Microsoft; Kellar Autumn, Lewis and Clark College; Microsoft; NASA. Bottom Row: Raymond A. Adomaitis, University of Maryland - College Park; Microsoft; Kalinichev, A.G. and Kirkpatrick, R.J., University of Illinois at Urbana-Champaign; Microsoft; Microsoft.

Funding

- Proposals must address NSF goals
  - Discovery
  - Learning
  - Research infrastructure
  - Stewardship
- Funding may be found in ENG and crosscutting/interdisciplinary programs

Funding Opportunities

- **Core programs**
- Exploratory research
- Collaborative/interdisciplinary areas
- Crosscutting and NSF-wide programs

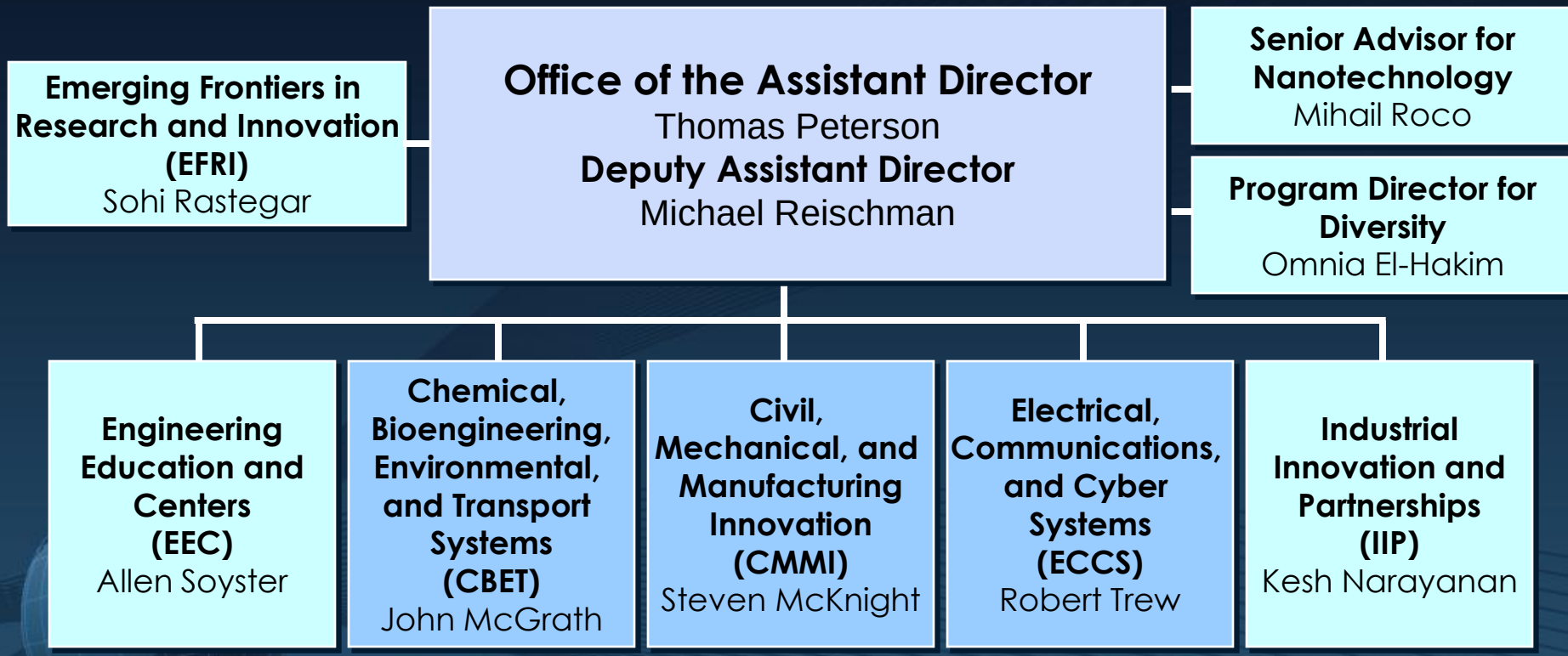
ENG Core Programs

- ENG divisions
- Faculty Early Career Development (CAREER)
- Broadening Participation

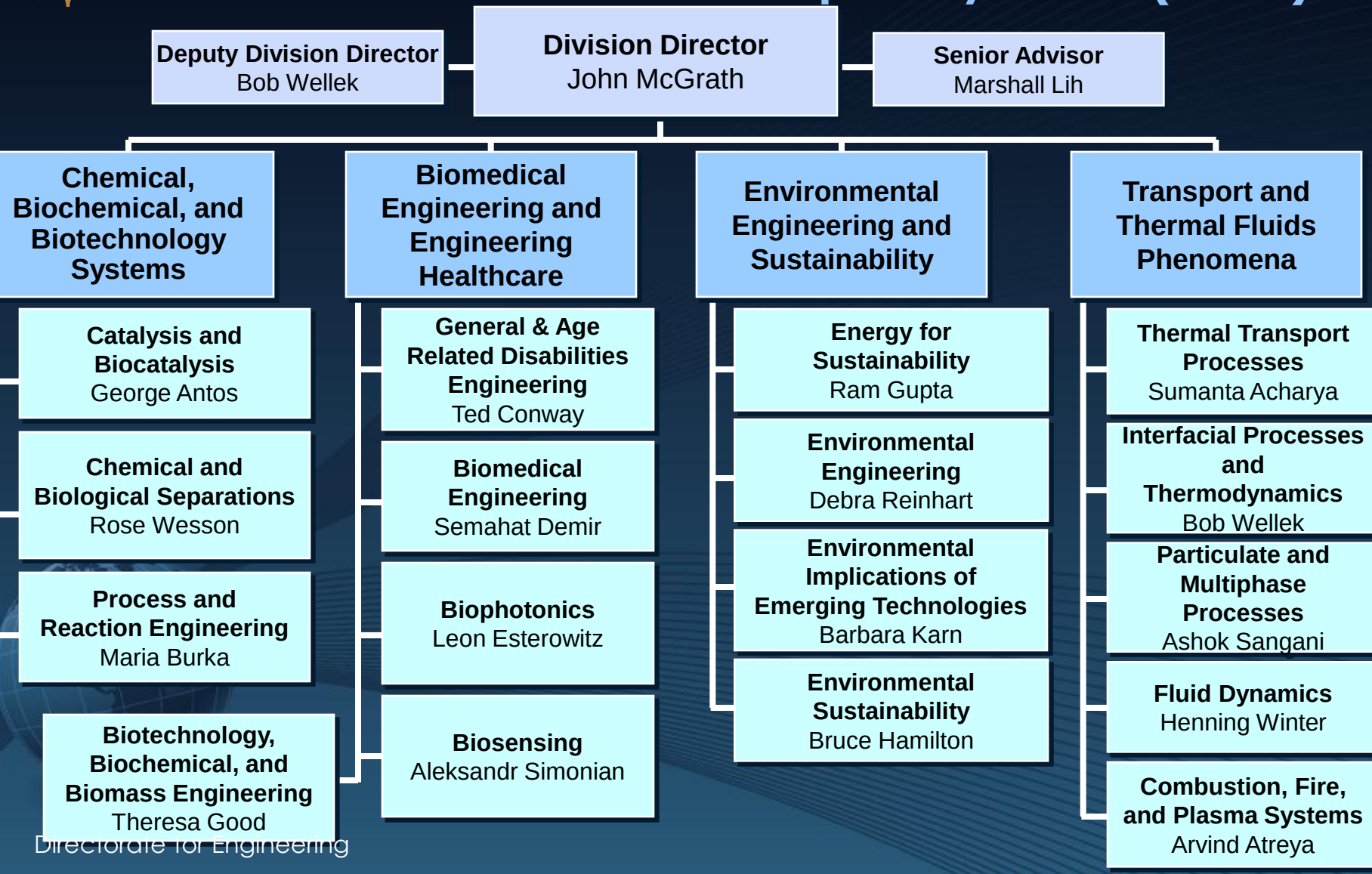
Proposals to ENG Divisions

- Proposals may be unsolicited or in response to a solicitations
- Submission windows and processes vary by division
- Awards are typically $240-300K for three years

ENG Organization



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



CBET Areas of Interest

- **Chemical, biochemical, and biotechnology:** research on the processing and manufacture of products by effectively utilizing chemical and renewable resources, often with the aid of bioinformatics from genomic and proteomic information
- **Biomedical engineering and engineering healthcare:** research to develop novel projects that integrate engineering and life science to solve biomedical problems that serve humanity
- **Environmental engineering and sustainability:** research that aims 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:** research on thermal, mass, and momentum transport that enable new technological solutions to understand pressing issues in energy, the environment, manufacturing, health care, and other fields
- Two submission deadlines per year: Sept. and Mar.

Water Sustainability and Climate

- Seeks to understand and predict the interactions between the water system and climate change, land use, the built environment, and ecosystem function and services through place-based research and integrative models.
- Letters of Intent due March 15; full proposals due April 15
- ~$16 M investment for 8–14 awards

ENG Contacts
Paul Bishop
Bruce Hamilton

NSF/DOE Partnership in Basic Plasma Science and Engineering

- Focuses on fundamental issues of plasma science and engineering that may impact other areas or disciplines in which improved basic understanding of the plasma state is needed
  - Proposals should discuss effective ways in which education is integrated within the research programs
  - Proposals directly related to fusion energy studies are not eligible
- Full proposals due in October through FY 2012
- ~$15 M investment for 30–35 awards

ENG Contact
Ted Bergman
(acting)

Civil, Mechanical, and Manufacturing Innovation (CMMI)

Division Director
Steven McKnight
Deputy Director
George Hazelrigg

Interdisciplinary and Cross-Divisional Activities
Bruce Kramer

Advanced Manufacturing

- **Manufacturing and Construction Machines and Equipment**
  George Hazelrigg
- **Manufacturing Enterprise Systems**
  Cerry Klein
- **Material Processing and Manufacturing**
  Mary Toney
- **Nano Manufacturing**
  Shaochen Chen

Mechanics and Engineering Materials

- **Geomechanics and Geotechnical Systems**
  John Daniels
- **Materials and Surface Engineering**
  Clark Cooper
- **Mechanics of Materials**
  Glaucio Paulino
- **Nano/Bio Mechanics**
  Glaucio Paulino
- **Structural Materials and Mechanics**
  Lawrence Bank

Resilient and Sustainable Infrastructures

- **Civil Infrastructure Systems**
  Dennis Wenger (acting)
- **NEES**
  Joy Pauschke
- **Geotechnical Engineering**
  John Daniels
- **Hazard Mitigation and Structural Engineering**
  M.P. Singh
- **Infrastructure Mgmt. and Extreme Events**
  Dennis Wenger

Systems Engineering and Design

- **Control Systems**
  Suhada Jayasuriya
- **Dynamical Systems**
  Eduardo Misawa
- **Engineering Design and Innovation**
  Christina Bloebaum
- **Operations Research**
  Robert Smith
- **Sensors and Sensing Systems**
  Shih Chi Liu
- **Service Enterprise Systems**
  Cerry Klein

CMMI Areas of Interest

- **Advanced manufacturing:** research leading to transformative advances in manufacturing and building technologies, with emphases on efficiency, economy, and sustainability
- **Mechanics and engineering materials:** research aimed at advances in the transformation and use of engineering materials efficiently, economically, and sustainably
- **Resilient and sustainable infrastructures:** research to advance fundamental knowledge and innovation for resilient and sustainable civil infrastructure and distributed infrastructure networks
- **Systems engineering and design:** research on the decision-making aspects of engineering, including design, control, and optimization
- Two submission deadlines each year: Oct. 1 and Feb. 15

George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Research

- NEES is a network of 14 earthquake engineering experimental equipment sites available for experimentation on-site or in the field
- Advances knowledge discovery and innovation for:
  - Earthquake and tsunami loss reduction of our nation's civil infrastructure
  - New experimental simulation techniques and instrumentation for NEES
- Submission deadline in March each year
- ~$7M investment for 8–12 awards

NEES
Joy Pauschke

Electrical, Communications, and Cyber Systems (ECCS)

Senior Engineering Advisor
Lawrence Goldberg

Division Director
Robert Trew

Electronics, Photonics, and Device Technologies

Optoelectronics; Nano-photonics; Ultrafast/Extreme Ultra-Violet Technologies
Vacant

Micro/Nanoelectronics; NEMS/MEMS; Bioelectronics; Sensors
Samir El-Ghazaly

Molecular, Spin, Organic, and Flexible Electronics; Micro/Nanomagnetics; Power Electronics
Pradeep Fulay

Microwave Photonics; Millimeter, Sub-millimeter, and Terahertz Frequency Devices and Components
Usha Varshney

Integrative, Hybrid, and Complex Systems

Optical, Wireless, and Hybrid Communications Systems; Inter and Intra-chip Communications; Mixed Signals
Andreas Weisshaar

Micro and Nano Systems; Systems-on-a-chip; Diagnostic and Implantable Systems
Rajinder Khosla

Cyber-Physical Systems; Next-Generation Cyber Systems; Signal Processing
Andreas Weisshaar (acting)

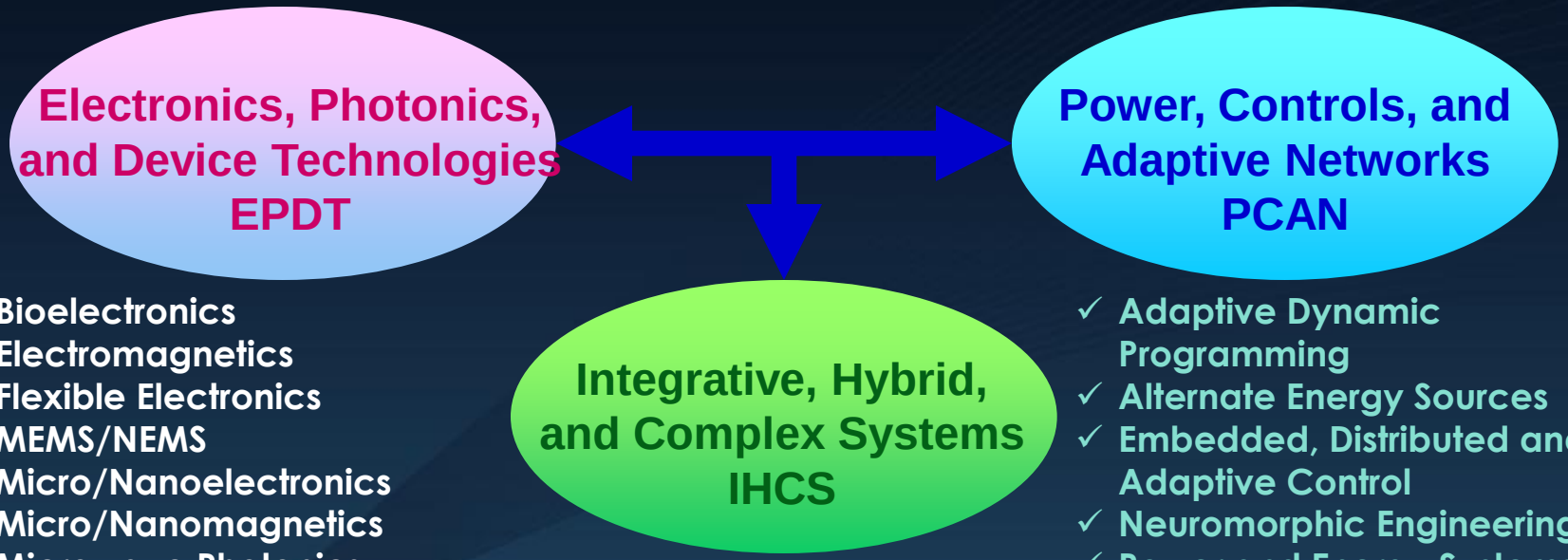
Power, Controls, and Adaptive Networks

Embedded, Distributed and Adaptive Control; Sensing and Imaging Networks; Systems Theory; Telerobotics
Radhakishan Baheti

Power and Energy Systems and Networks and their Inter-dependencies; Power Drives; Renewable/Alternative Energy Sources
Dagmar Niebur

Adaptive Dynamic Programming; Quantum and Molecular Modeling and Simulations; Neuromorphic Engineering
Paul Werbos

ECCS Areas of Interest



- ✓Bioelectronics
- ✓Electromagnetics
- ✓Flexible Electronics
- ✓MEMS/NEMS
- ✓Micro/Nanoelectronics
- ✓Micro/Nanomagnetics
- ✓Microwave Photonics
- ✓Molecular Electronics
- ✓Nanophotonics
- ✓Optoelectronics
- ✓Power Electronics
- ✓Sensors and Actuators
- ✓Spin Electronics

- ✓Nanosystems/Microsystems/ Macrosystems
- ✓Cyber Systems and Signal Processing
- ✓Nano and Microsystems
  - ✓System-on-a-chip
  - ✓System-in-a-package
- ✓RF and Optical Wireless and Hybrid Communications Systems
  - ✓Inter- and Intra-chip Communications
  - ✓Mixed Signals

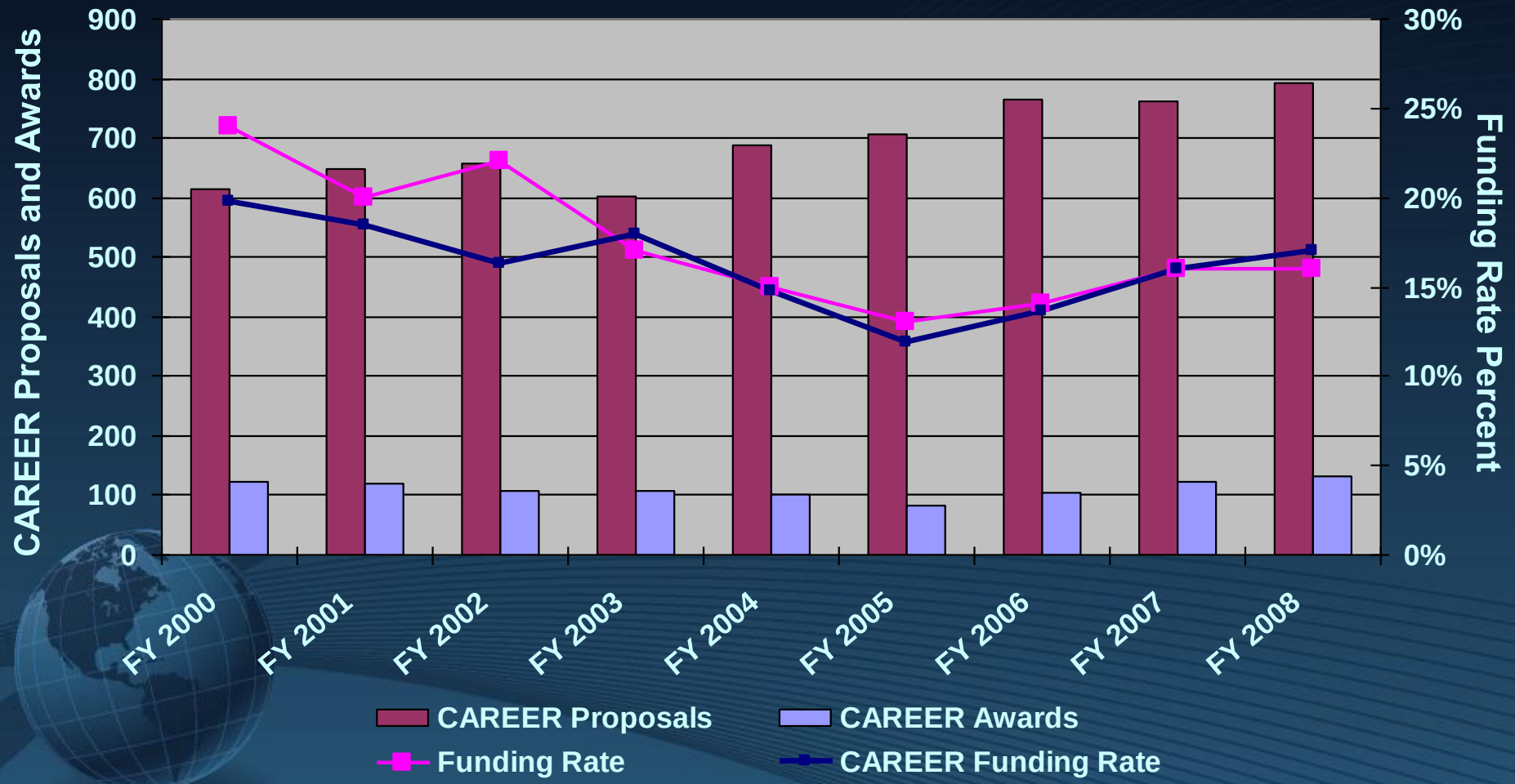
- ✓ Adaptive Dynamic Programming
- ✓ Alternate Energy Sources
- ✓ Embedded, Distributed and Adaptive Control
- ✓ Neuromorphic Engineering
- ✓ Power and Energy Systems and Networks
- ✓ Quantum and Molecular Modeling and Simulation of Devices and Systems
- ✓ Sensing and Imaging Networks
- ✓ Telerobotics

Faculty Early Career Development (CAREER) Program

- Supports junior faculty who exemplify the role of teacher-scholars through
  - outstanding research
  - excellent education
  - integration of education and research
- Encourages women, members of under-represented minority groups, and persons with disabilities to apply
- $80M invested each year for 425 new awards
- ENG awards are ≤$400K for 5 years
- Deadlines vary by directorate;
  ENG proposals due July 21, 2010

ENG Contact
Sharon Middledorf

ENG CAREER Proposals and Awards



Broadening Participation

- Broadening Participation Research Initiation Grants in Engineering (BRIGE)
- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers
- Graduate Research Fellowships for Women
- Graduate Research Supplements

Broadening Participation

"When I was young, … providing equal (educational) opportunities for everyone was a matter of social justice – part of the social contract in the United States. Now, … it is a matter of national survival. Any country that fails to encourage and develop the talent in each individual through its public school system will suffer greatly…."

Bruce Alberts, Editor-in-Chief of *Science*

Editorial, *Science* Vol. 323, 2 January 2009

Broadening Participation

"We take different approaches to problems, and the best solutions are achieved by the greatest diversity."

Doug Wilde, Professor Emeritus

Mechanical Engineering, Stanford University

Mechanical Engineering Vol. 132, February 2010

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
- Up to $175,000 over two years
- Full proposals due February, 2011

ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers

ADVANCE supports three types of activities:

- **Partnerships for Adaptation, Implementation, and Dissemination (PAID)**
  - the adaptation, implementation, dissemination, and diffusion of effective materials and practices; and to advance understanding of gender in the STEM academic workforce (PAID-Research)
- **Institutional Transformation (IT)**
  - Systemic organizational approaches for institution-wide change
- **Institutional Transformation Catalyst (IT-Catalyst)**
  - institutional self-assessment activities to identify specific issues in the recruitment, retention, and promotion of women faculty in STEM academics
- Next solicitation is expected in the first half of 2010

Funding Opportunities

- Core programs
- **Exploratory and urgent research**
- Collaborative/interdisciplinary areas
- Crosscutting and NSF-wide programs

Exploratory and Urgent Research

- Early-Concept Grants for Exploratory Research (EAGER)
- Grants for Rapid Response Research (RAPID)
- Emerging Frontiers in Research and Innovation (EFRI)

Early-Concept Grants for Exploratory Research (EAGER)

- Supports high-risk, exploratory, and potentially transformative research
- Began Jan. 1, 2009
- Up to $300K over two years
- May be submitted any time; contact program officer prior to proposal submission

Grants for Rapid Response Research (RAPID)

- Supports research of great urgency with regard to data, facilities, or equipment, such as research on disasters
- Up to $200K over one year
- May be submitted any time; contact program officer prior to proposal submission

Emerging Frontiers in Research and Innovation (EFRI)

- Supports higher-risk, higher-payoff opportunities that:
  - Are potentially transformative
  - Address a national need or grand challenge
- Topic areas for FY 2010 are:
  - Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings
  - Renewable Energy Storage (RESTOR)
- $29M investment for 4-year awards at ~$500K per year
- Letters of Intent due in Oct.; preliminary proposals due in Nov.; invited full proposals due in March
- EFRI Web site: www.nsf.gov/eng/efri

EFRI
Sohi Rastegar

Funding Opportunities

- Core programs
- Exploratory research
- **Collaborative/interdisciplinary areas**
- Crosscutting and NSF-wide programs

ENG Collaborative and Interdisciplinary Research

- ENG interdisciplinary research (IDR)
- Engineering Education and Centers
- Industrial Innovation and Partnerships

Interdisciplinary Research Is…

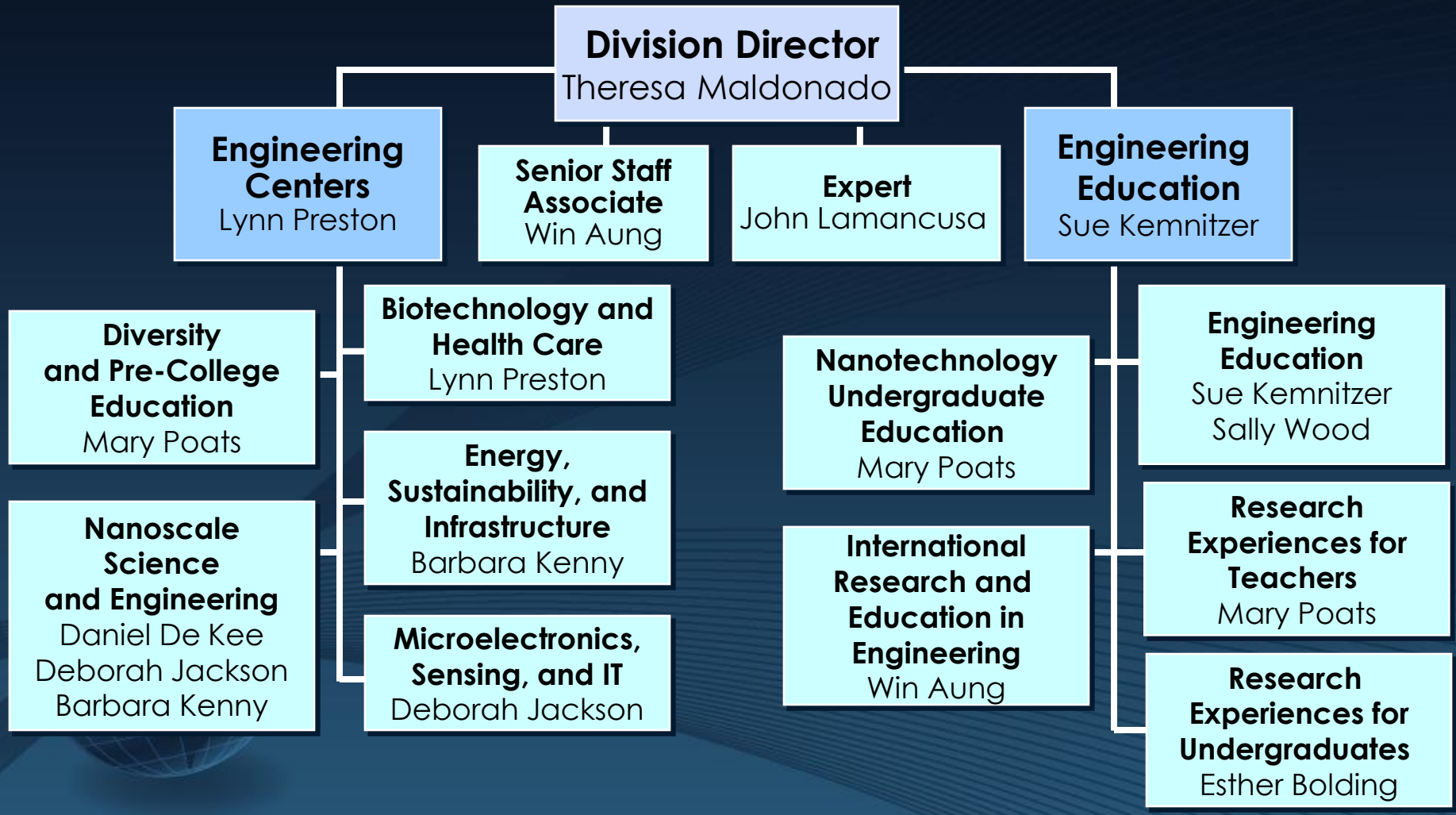
"… a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice."

Facilitating Interdisciplinary Research, The National Academies Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy, The National Academies Press, Washington, D.C., 2004.

ENG Interdisciplinary Research (IDR) Proposals

- Propose a level of interdisciplinary content not covered in the core programs of ENG
- Must attract funding from at least two divisions of NSF, with primary funding from ENG.
- Usually involve a team of 2–4 investigators.
- Typically $300–500K for up to three years, although awards up to $1M are considered.
- Full proposals due December 7, 2009; submission guidelines at http://nsf.gov/eng/general/IDR/index.jsp

Engineering Education and Centers (EEC)



Engineering Centers

- Supports collaboration with industry to promote innovative research and education
- Engineering Research Centers
  - 15 in operation, including 5 new for 2008
    - Funding for 10 years
  - 2-year process from solicitation to funding
  - FY 2010 competition is underway
- Nanoscale Science and Engineering Centers
  - 6 of 10 are engineering
  - 2007 solicitation to establish a Center for the Environmental Implications of Nanotechnology

Engineering Research Centers

- FY 2010 awards will be made in the following topic areas:
  - Complex, coupled physical civil infrastructure systems under stress
  - Energy systems for a sustainable future
  - Transformational engineered systems — open category with topic chosen by the proposing ERC team
- ~$13M to fund 2–4 awards
- Letters of Intent due May 15, 2009; preliminary proposals due July 15, 2009; invited full proposals due May 5, 2010

ENG Contact
Lynn Preston

Engineering Education Research

- Addresses educational goals of the engineering community
- Supports focused efforts that integrate research into advances in undergraduate and PhD engineering education, and partner with K–12 pipeline innovators

Innovations in Engineering Education, Curriculum, and Infrastructure

- FY 2010 awards will be made in the following topic areas:
  - Innovations in Teaching and Learning
  - Translation of Engineering Education Research into our Classrooms
  - Implementation of Programs for Students Supported by the GI Bill
- ~$8.5M for 35–40 awards
- Full proposals due Jan. 20, 2010, in area 1, and March 31, 2010, in areas 2 and 3

ENG Contact
Sue Kemnitzer

Tribal Colleges and Universities Program (TCUP)

- To enhance the quality of STEM instructional and outreach programs at Tribal Colleges and Universities, Alaska Native-serving Institutions and Native Hawaiian-serving Institutions.
- Awards in three tracks:
  - Planning
  - Implementation
    - TCUP Initiation
    - STEM Teachers of Excellence Education Projects (STEEP)
    - Pre-engineering Education Collaboratives (PEEC)
  - Innovation through Institutional Integration (I^3)
- Various deadlines, beginning Jan. 14, 2010

ENG Contact (PEEC)
Michael Reischman

NSF-wide Education Programs

- Integrative Graduate Education and Research Traineeship (IGERT)
  - ~20 awards each year
  - Pre-proposals due in March, full proposals due in Sept.
- Graduate Teaching Fellows in K-12 Education (GK-12)
  - ~20 awards each year
  - Letters of Intent due in May, full proposals due in June
- Graduate Research Fellowships (GRF)
  - ~1000 fellowships awarded each year
  - Engineering and interdisciplinary proposals due in Nov. each year

Ethics Education for Science and Engineering

- Invests in research and education projects to improve ethics education in all of the fields of science and engineering that NSF supports, especially in interdisciplinary or inter-institutional contexts
- Focuses on improving ethics education for graduate students, although proposed programs may benefit undergraduates as well
- ~$2.4M for 6–12 awards
- Full proposals due March 1, 2010

ENG Contact
Sue Kemnitzer

Human Resource Development

- Nanotechnology Undergraduate Education
  - Introduces nanotechnology into undergraduate engineering education.
  - Focuses on devices and systems and/or on the societal, ethical, economic and/or environmental issues relevant to nanotechnology
  - ~$19M for 10 awards; proposals due May 7, 2010
- Research Experiences for Undergraduates (REU)
  - Supports the involvement undergraduates in ongoing research
  - $10M/year available for engineering; deadline for site proposals in Aug. each year
- Research Experiences for Teachers (RET) in Engineering
  - Supports the active involvement of K-12 teachers and community college faculty in engineering research to bring knowledge of engineering and technological innovation into their classrooms
  - $4M/year available; deadline in Nov. each year

Industrial Innovation and Partnerships (IIP)

Division Director
Kesh Narayanan

Academic Partnerships
Donald Senich

- **Grant Opportunities for Academic Liaison with Industry**
  Donald Senich
- **Industry/University Cooperative Research Centers**
  Rathindra DasGupta
  Glenn Larsen
- **Partnerships for Innovation**
  Sara Nerlove
- **Expert/Special Topics**
  Alex Schwarzkopf

- **Advanced Electronics**
- **Advanced Manufacturing**
- **Advanced Materials**
- **Biotechnology**
- **Civil Infrastructure Systems**
- **Energy and the Environment**
- **Fabrication and Processing Technology**
- **Health and Safety**
- **Information and Communications**
- **Quality, Reliability and Maintenance**
- **System Design and Simulation**

Small Business Partnerships
Joe Hennessey

- **Nanotechnology, Advanced Materials and Manufacturing**
  Cheryl Albus, Bill Haines, Ben Schrag, Grace Wang
- **Biotechnology and Chemical Technology**
  Gregory Baxter, Josephine Yuen, Cynthia Znati
- **Information and Communications Technology**
  Errol Arkilic, Juan Figueroa, Murali Nair
- **Expert/Special Topics**
  Ian Bennet, James Rudd, George Vermont

Grant Opportunities for Academic Liaison with Industry (GOALI)

- Effectively promotes the transfer of knowledge between academe and industry, student education, and the exchange of culture
- Supports:
  - Faculty and students in industry (≤ 1 year)
  - Industry engineers/scientists in academe (≤ 1 year)
  - Industry-university collaborative projects (≤ 3 years)
- $5M available for co-funding with all NSF Directorates
- Proposals accepted anytime; ~70 awards each year

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
- ~$9M 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 (PFI)

- Catalyzes partnerships among colleges and universities, the private sector, and governments
- Supports one or more of the following activities:
  - research, knowledge transfer, and/or commercialization
  - workforce education and training
  - establishing the infrastructure for innovation
- $9.5M to fund 12–15 awards each year; grants are up to $600,000 for 2–3 years
- New solicitation in 2010

Small Business Innovation Research (SBIR) Programs

- Encourages small firms to undertake cutting-edge research with the potential for significant economic and public benefits
- Supports
  - Biotechnologies and chemical technologies
  - Education applications
  - Information and communication technologies
  - Nanotechnology, advanced materials, and manufacturing
- $45M for 200–300 awards
- Full proposals due in June and Dec.

Small Business Technology Transfer (STTR) Programs

- Encourages small firms to undertake cutting-edge research with the potential for significant economic and public benefits
- Enables university researchers to spin off commercially promising ideas while remaining employed primarily at the research institution
- Supports multi-functional materials
- $5M for ~35 awards
- Full proposals due Nov. 17, 2009

Funding Opportunities

- Core programs
- Exploratory research
- Collaborative/interdisciplinary areas
- **Crosscutting and NSF-wide programs**

Crosscutting and NSF-wide Opportunities

- Building Engineered Complex Systems
- Cyber-Enabled Discovery and Innovation (CDI)
- Cyber-Physical Systems (CPS)
- Domestic Nuclear Detection Office/NSF Academic Research Initiative (ARI)
- Major Research Instrumentation (MRI) Program
- Pan-American Advanced Studies Institutes Program (PASI)
- Partnerships for International Research and Education (PIRE)

http://www.nsf.gov/funding/pgm_list.jsp?org=ENG

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National Science Foundation
DIRECTORATE FOR
Engineering (ENG)

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Engineering (ENG) Active Funding Opportunities

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Get ENG Upcoming Due Dates Updates by Email | RSS What is RSS?

Sorted by Title. Click column headings to sort. Status: Active

Key: C Crosscutting | N NSF-wide | G Grants.gov submission required

Title	Program Guidelines	Due Dates
Academic Research Infrastructure Program: Recovery and Reinvestment (ARI-R²) C	09-562	Letter of Intent: July 1, 2009 Full Proposal: August 24, 2009
ACCELERATING DISCOVERY IN SCIENCE AND ENGINEERING THROUGH PETASCALE SIMULATIONS AND ANALYSIS (PetaApps) C	08-592	

Cyber-Enabled Discovery and Innovation (CDI)

- CDI is a five-year initiative to create revolutionary science and engineering research outcomes made possible by innovations and advances in computational thinking
- Seeks proposals within or across the following three thematic areas:
  - From Data to Knowledge
  - Understanding Complexity in Natural, Built, and Social Systems
  - Virtual Organizations
- ~$36M investment in FY 2010 for 30 grants
- Type I proposals due Feb. 4, Type II proposals due Feb. 5

ENG Contact
Maria Burka
Eduardo Misawa

Cyber-Physical Systems (CPS)

- Refers to the tight conjoining of and coordination between computational and physical resources
- Seeks proposals that address a CPA research theme:
  - **Foundations** research to develop new principles, algorithms, models, and theories
  - **Methods and Tools** research to bridge gaps between approaches to the cyber and physical elements of systems through innovations
  - **Components, Run-time Substrates, and Systems** research motivated by grand challenge applications
- ~$30M investment for 30–40 grants for small, medium, and large projects
- Full proposals due March 11, 2010

ENG Contact
Kishan Baheti

Domestic Nuclear Detection Office/NSF Academic Research Initiative (ARI)

- Focused on detection systems, individual sensors or other research for the detection of nuclear weapons or material, radiation dispersal devices, and related threats
- Possible topics include:
  - Detector materials, concepts and designs for new sensors and sensing systems
  - Non-intrusive active interrogation systems; particle generators and accelerators, associated detectors, and algorithms for improved data analysis
  - Nuclear forensics and attribution
- 7–8 awards for up to $400K annually per award for up to five years
- Full proposals due April 26, 2010

ENG Contact
Suhada Jayasuriya

Major Research Instrumentation (MRI) Program

- Goals of the program are to:
  - Support the acquisition or development of major state-of-the-art instrumentation
  - Improve access to and increase use of modern research and research training instrumentation
  - Enable the creation of well-equipped learning environments that integrate research with education
  - Foster the development of the next generation of instrumentation
  - Promote partnerships
- Typically ~$110M investment for approximately 225 awards
- Letters of Intent due in Dec.; full proposals due Jan. 28, 2010

ENG Contact
Lawrence Goldberg

Pan-American Advanced Studies Institutes (PASI) Program

- Aims to disseminate advanced scientific and engineering knowledge and stimulate training and cooperation among researchers of the Americas
- Supports courses that
  - Ranging in length from ten days to one month duration,
  - Involve lectures, demonstrations, research seminars and discussions
  - Are taught at the advanced graduate and post-doctoral level
- ~$500K annual investment for 6–8 grants
- Full proposals due March 19, 2010

Office of International Science and Engineering
Harold Stolberg

Partnerships for International Research and Education (PIRE)

- Seeks to catalyze a cultural change in U.S. institutions by establishing innovative models for international collaborative research and education
- Other objectives include to:
  - Provide international research experiences for U.S. students and faculty
  - Build strong international partnerships
  - Develop new replicable models for international collaborative research and education
  - Raise the profile and increase the importance of international collaborative research and education
- New solicitation in fall 2010.

Office of International Science and Engineering
Elizabeth Lyons

Successful Proposals

Credit: Top Row: University of Illinois, Graduate School of Library and Information Science; © 2004 Hybrid Medical Animation; Daniel Cardenas from Wikipedia Commons; Chris Jacobs, Rolf Mohr, and Dean Fowler, NASA. Middle Row: Latika Menon and Donald O'Malley, Northeastern University; Hatsukari715 from Wikipedia Commons; Vika from Wikipedia Commons; NASA. Bottom Row: NASA; DOE; Cohesion from Wikipedia Commons; NASA/MSFC; © 2005 UCLA Healthcare

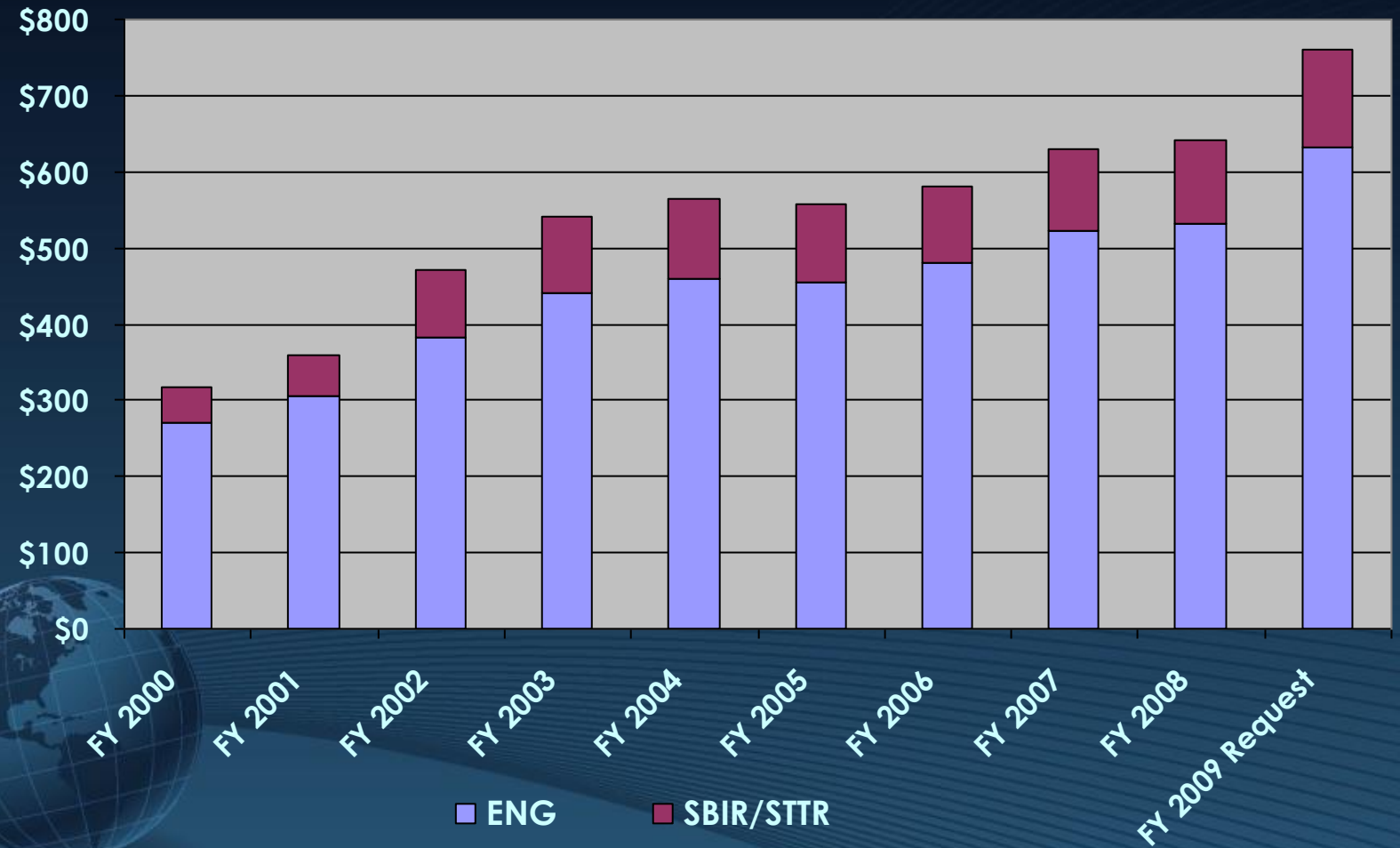
First Steps

- Begin with
  - Dialog with program officer
  - White paper
  - Short biography
- Get involved with NSF reviews

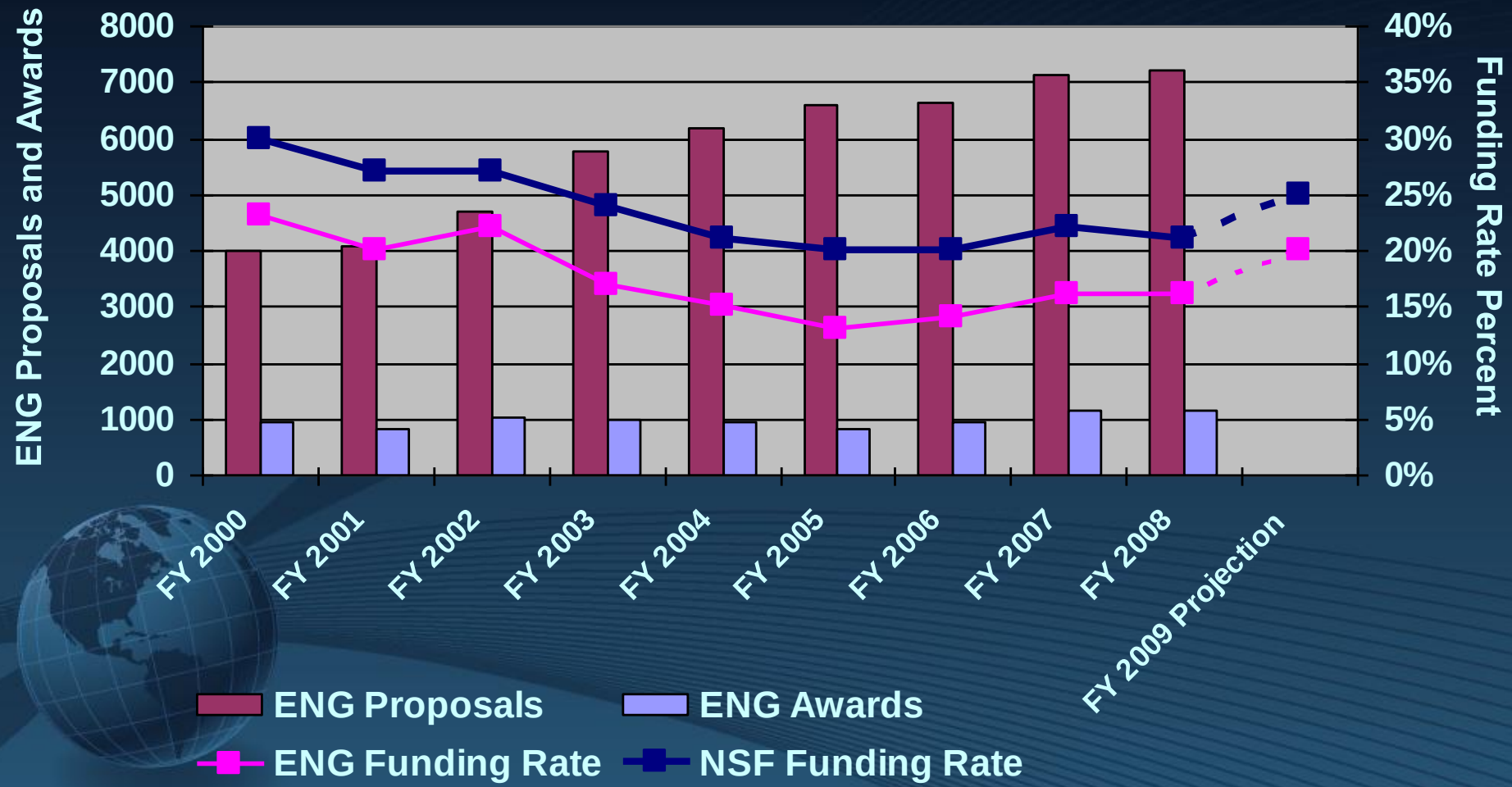
What Do Reviewers Look For?

- Proposals that address one or more NSF goals:
  - Discovery
  - Learning
  - Research infrastructure
  - Stewardship
- Intellectual merit
- Broader impact

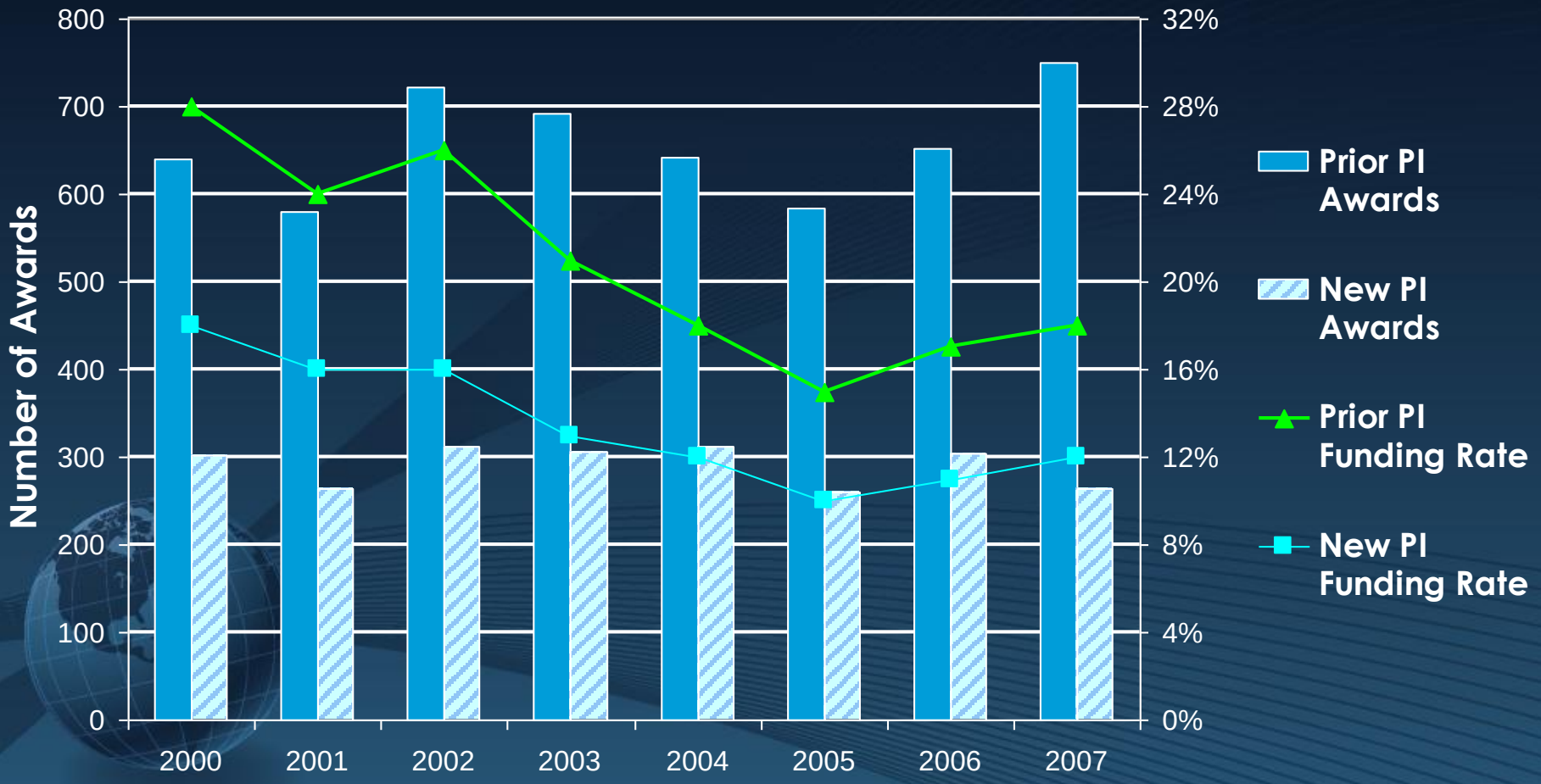
ENG and SBIR/STTR Budgets ($M)



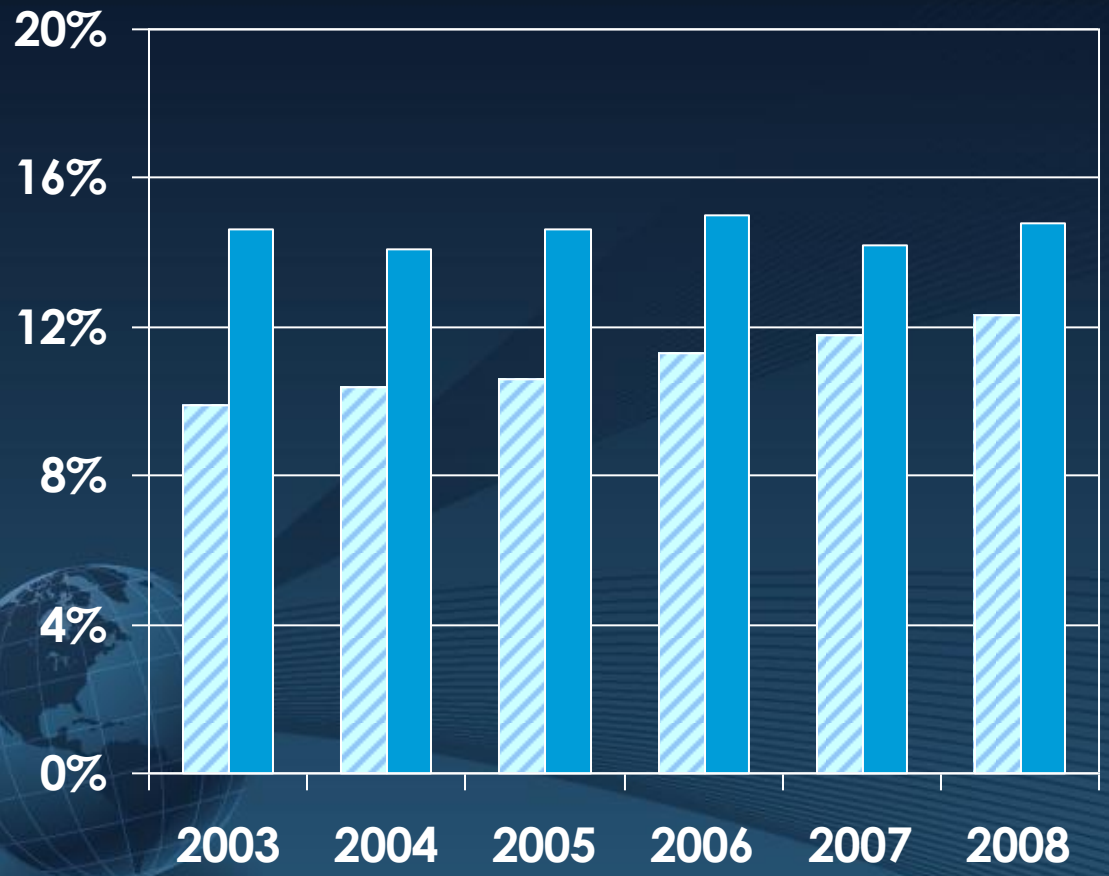
ENG Research Grant Proposals and Awards



ENG Funding Rates for Prior and New PIs



Proposal Submissions to ENG by Women

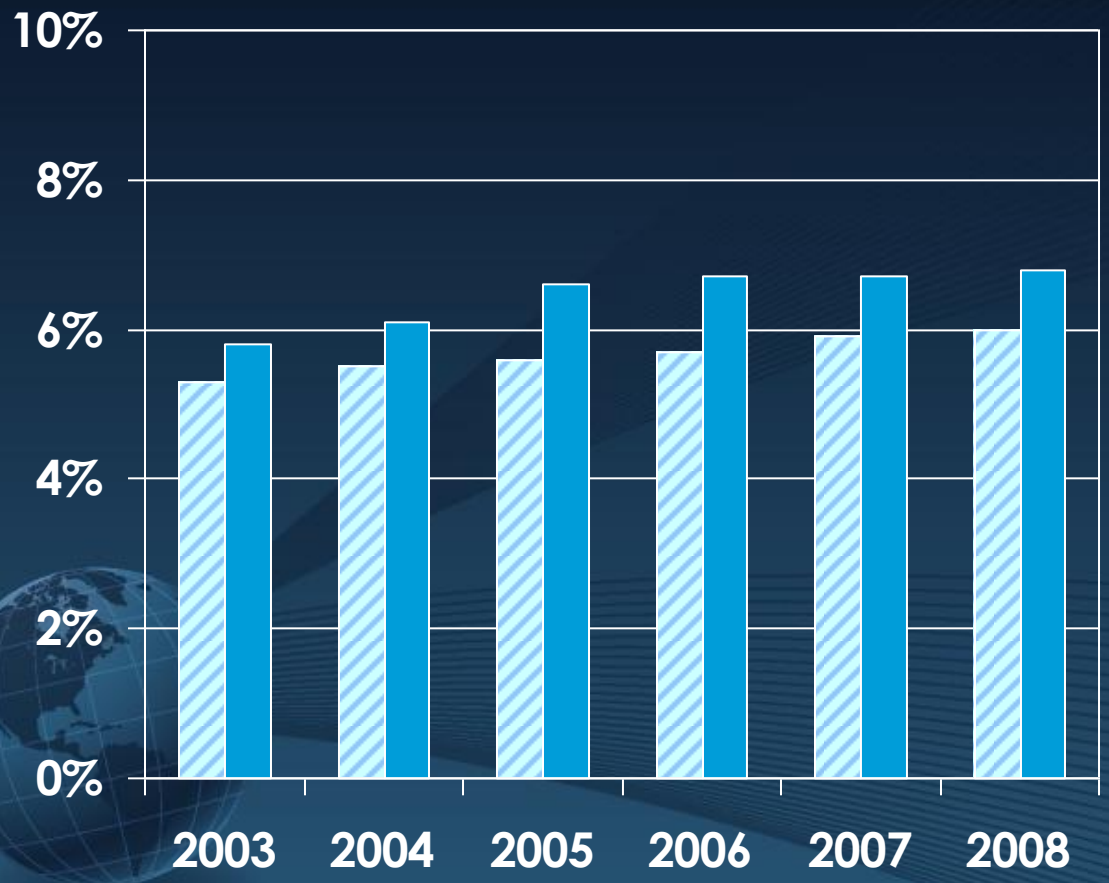


Women Faculty Nationwide*

Proposal Submissions to ENG by Women

* Source: ASEE, 2009, *Engineering By the Numbers*

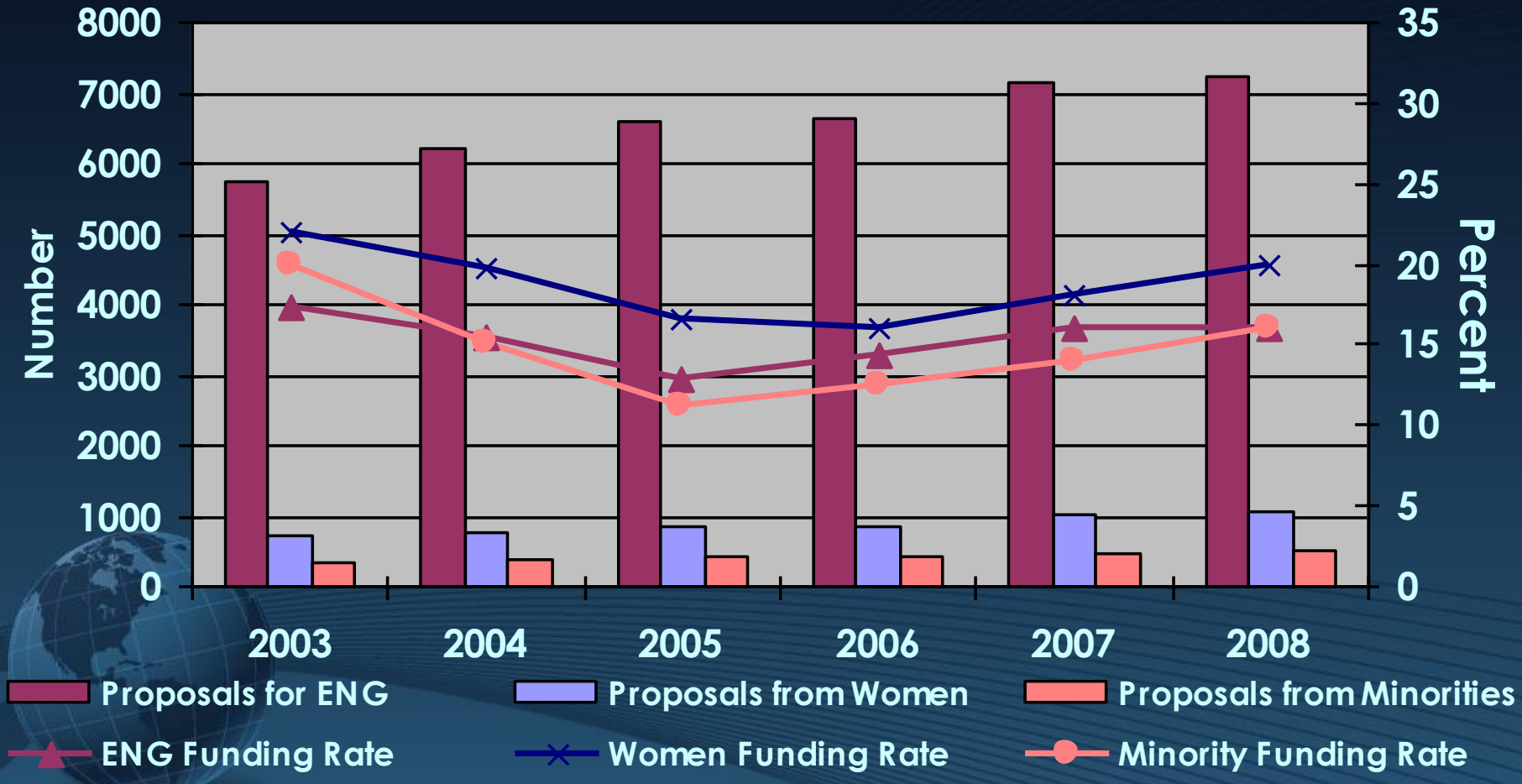
Proposal Submissions to ENG by Under-Represented Minorities



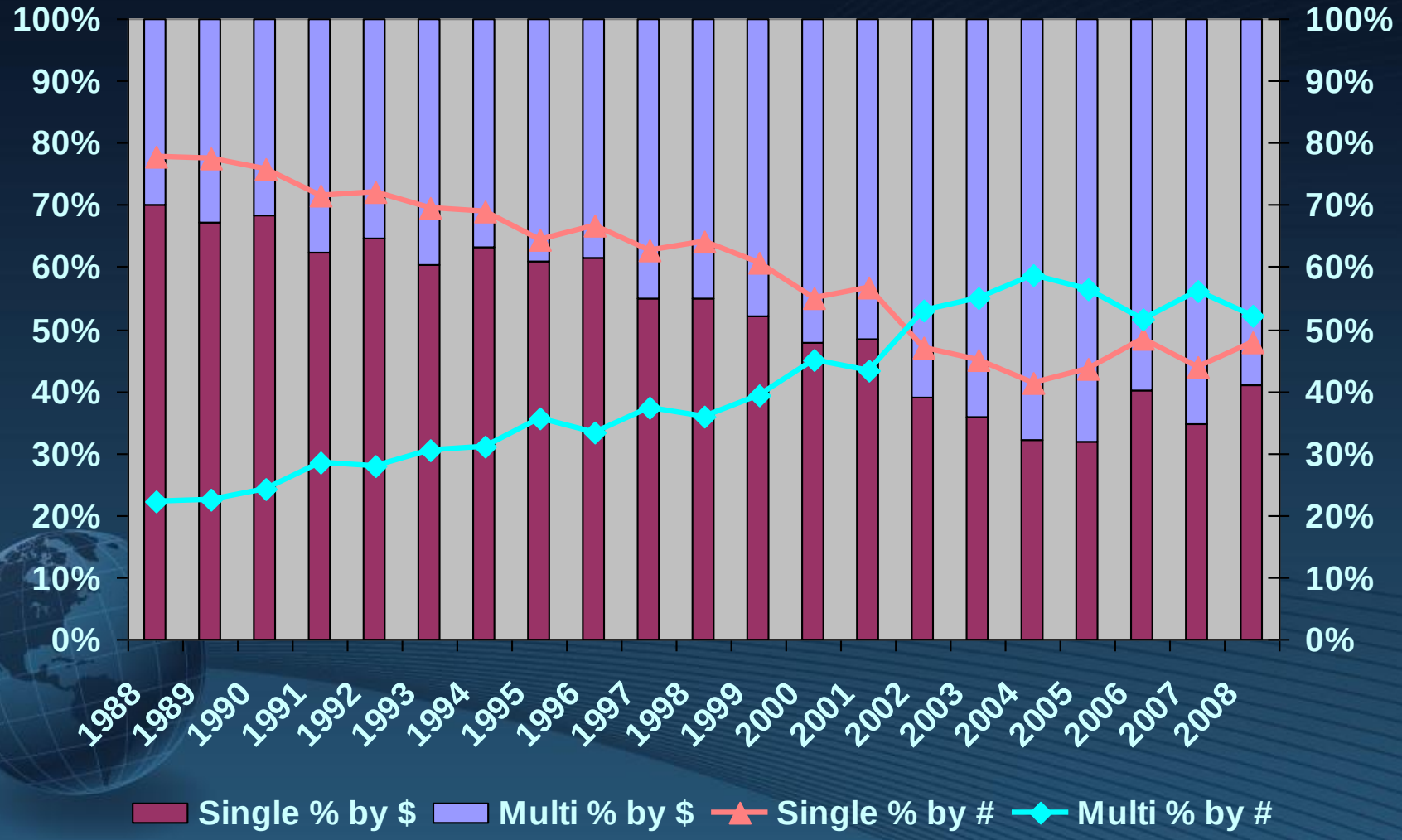
- Under-Represented Minority Faculty Nationwide*
- Proposal Submissions to ENG by Under-Represented Minorities

* Source: ASEE, 2009, *Engineering By the Numbers*

Research Proposal Funding Rates for All ENG, Women, and Under-Represented Minorities



Single vs. Multiple Investigator ENG Awards



Resources

- Directorate for Engineering:
  - **Ted Conway**, Program Director, General & Age Related Disabilities Engineering, CBET
  - tconway@nsf.gov and 703-292-7091
  - http://www.nsf.gov/eng
- Funding Opportunities: http://www.nsf.gov/funding/
- NSF Email Updates: www.nsf.gov