

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



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## 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 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

## 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 Opportunities

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

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## ENG Core Programs

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



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## Proposals to ENG Divisions

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



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# ENG Organization

**Emerging Frontiers in Research and Innovation (EFRI)**  
Sohi Rastegar

**Office of the Assistant Director**  
Thomas Peterson  
Deputy Assistant Director  
Michael Reischman  
Program Director for Diversity & Outreach  
Omnia El-Hakim

**Senior Advisor for Nanotechnology**  
Mihail Roco

**Engineering Education and Centers (EEC)**  
Allen Soyster

**Chemical, Bioengineering, Environmental, and Transport Systems (CBET)**  
John McGrath

**Civil, Mechanical, and Manufacturing Innovation (CMMI)**  
Steven McKnight

**Electrical, Communications, and Cyber Systems (ECCS)**  
Robert Trew

**Industrial Innovation and Partnerships (IIP)**  
Kesh Narayanan



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

**Deputy Division Director**  
Bob Wellek

**Division Director**  
John McGrath

**Senior Advisor**  
Marshall Lih

## Chemical, Biochemical, and Biotechnology Systems

**Catalysis and Biocatalysis**  
John Regalbuto

**Chemical and Biological Separations**  
Rose Wesson

**Process and Reaction Engineering**  
Maria Burka

**Biotechnology, Biochemical, and Biomass Engineering**  
Fred Heineken

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## Biomedical Engineering and Engineering Healthcare

**Bioengineering, Interdisciplinary, and Centers**  
Aleksandr Simonian

**Biomedical Engineering**  
Semahat Demir

**Biophotonics, Advanced Imaging, and Sensing for Human Health**  
Leon Esterowitz

**Research to Aid Persons with Disabilities**  
Ted Conway

## Environmental Engineering and Sustainability

**Energy for Sustainability**  
Gregg Rorrer

**Environmental Engineering**  
Paul Bishop

**Environmental Implications of Emerging Technologies**  
Cynthia Ekstein

**Environmental Sustainability**  
Bruce Hamilton

## Transport and Thermal Fluids

**Thermal Transport Processes**  
Theodore Bergman

**Interfacial Processes and Thermodynamics**  
Bob Wellek

**Particulate and Multiphase Processes**  
Marc Ingber

**Fluid Dynamics**  
Henning Winter

**Combustion, Fire, and Plasma Systems**  
Theodore Bergman \*

\* Acting



## CBET Areas of Interest

- **Chemical, biochemical, and biotechnology:** research on the processing and manufacture of products using chemical and renewable resources, often with the aid of bioinformatics from genomic and proteomic information
- **Biomedical engineering and engineering healthcare:** research to integrate engineering and life science to solve biomedical problems that serve humanity
- **Environmental engineering and sustainability:** research to reduce the adverse effects of solid, liquid, and gaseous discharges from human activity that degrade the ecological value of the land, water, and air.
- **Transport and thermal fluids phenomena:** research on thermal, mass, and momentum transport that enables new understanding of and technological solutions to pressing issues in energy, the environment, manufacturing, health care, and other fields
- Two submission deadlines per year: September and March



## 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 in the research programs
  - > Proposals directly related to fusion energy studies are not eligible
- Full proposals due in October of each year, through FY 2012
- ~\$15 M investment for 30–35 awards

**ENG Contact**  
Ted Bergman  
(acting)

# Civil, Mechanical, and Manufacturing Innovation (CMMI)



**Deputy Division Director**  
George Hazelrigg

**Division Director**  
Steven McKnight

**Senior Advisor**  
Bruce Kramer

**Interdisciplinary and Cross-Directorate Programs**  
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**  
Demitris Kouris

**Structural Materials and Mechanics**  
Lawrence Bank

## Resilient and Sustainable Infrastructures

**Civil Infrastructure Systems**  
Dennis Wenger \*

**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

\* Acting



## 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 to advance the efficient, economical, and sustainable transformation and use of engineering materials
- **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 15 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 of 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  
Eric Johnson

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  
Yogesh Gianchandani

Cyber-Physical Systems; Next-Generation Cyber Systems; Signal Processing  
Scott Midkiff

## 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 / Pinaki Mazumder



# ECCS Areas of Interest



**Electronics, Photonics,  
and Device Technologies  
EPDT**

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

**Integrative, Hybrid,  
and Complex Systems  
IHCS**

- 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

**Power, Controls, and  
Adaptive Networks  
PCAN**

- 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



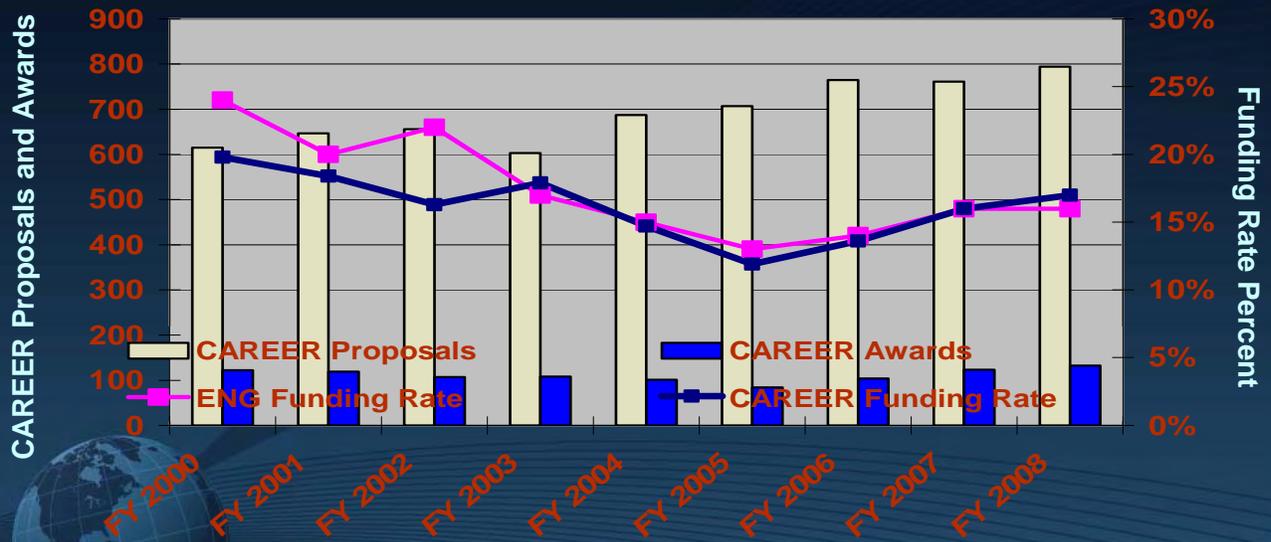
## Faculty Early Career Development (CAREER) Program

- Supports young faculty teacher-scholars who provide role models for the performance of outstanding research and education and their integration
- 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  $\leq$ \$400K for 5 years
- Deadlines vary by directorate;  
ENG proposals due July 21, 2010

**ENG Contact**  
Sharon Middledorf



# ENG CAREER Proposals and Awards



CAREER Proposals and Awards

Funding Rate Percent



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## 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 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
- Proposals due February 14, 2010



## 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)
  - > Letters of Intent due: January 2010 (estimated)  
Full proposals due: February 2010 (estimated)
- **Institutional Transformation (IT)**
  - > Systemic organizational approaches for institution-wide change
  - > Letters of Intent due: August 2010 (estimated)  
Full proposals due: November 2010 (estimated)
- **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
  - > Letters of Intent due: August 2010 (estimated)  
Full proposals due: November 2010 (estimated)



## 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 total over two years (usually significantly less)
- May be submitted at any time; must 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 at any time; must contact program officer prior to proposal submission



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## Emerging Frontiers in Research and Innovation (EFRI)

- Supports higher-risk, higher-payoff opportunities that:
  - > Are potentially transformative
  - > Address a national need or grand challenge
  - > Are at a stage where a significant investment will make a difference
- 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 October; preliminary proposals due in November; invited full proposals due in March
- EFRI Web site: [www.nsf.gov/eng/efri](http://www.nsf.gov/eng/efri)

**EFRI**  
Sohi Rastegar



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## 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.

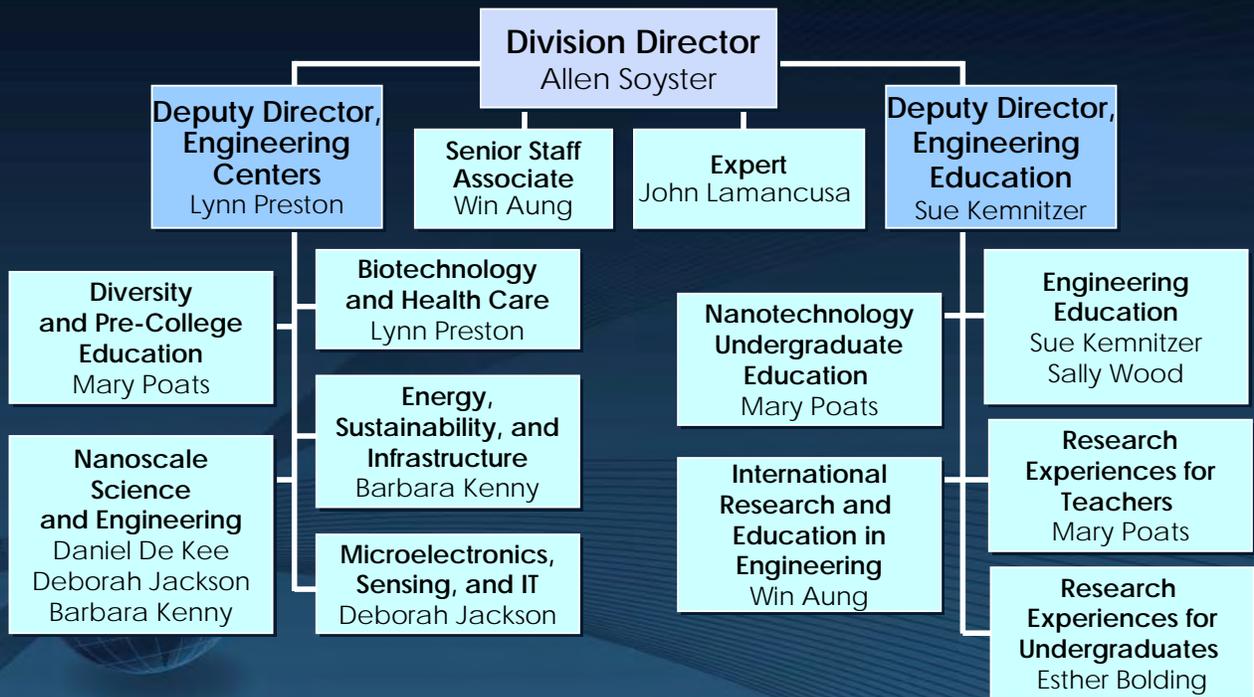


## ENG Interdisciplinary Research (IDR) Proposals

- IDR review is intended for proposals requiring a level of interdisciplinary expertise not available in the core programs of ENG.
- IDR proposals may be on any topic relevant to engineering and, in particular, should not be constrained by the current program structure.
- IDR proposals are usually submitted by a team of 2–4 investigators.
- Typically \$400–600K for up to three years, although awards up to \$1M are considered.
- See 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
  - > 9 of 16 are in engineering



## 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
- The current competition is closed

**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



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## Innovations in Engineering Education, Curriculum, and Infrastructure

- Supports research that addresses four aspects of engineering education:
  - > how students best learn to become creative and innovative engineers, and how this learning is measured
  - > how cyber-learning resources can be used to develop tools and systems that significantly improve learning
  - > integration of sustainability into engineering education
  - > future directions of U.S. engineering doctoral programs
- Look for new announcement in fall 2009



**ENG Contact**  
Sue Kemnitzer

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## NSF-wide Education Programs

- Integrative Graduate Education and Research Traineeship (IGERT)
  - > ~20 awards each year
  - > Pre-proposals due in March, full proposals due in September
- 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 November 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

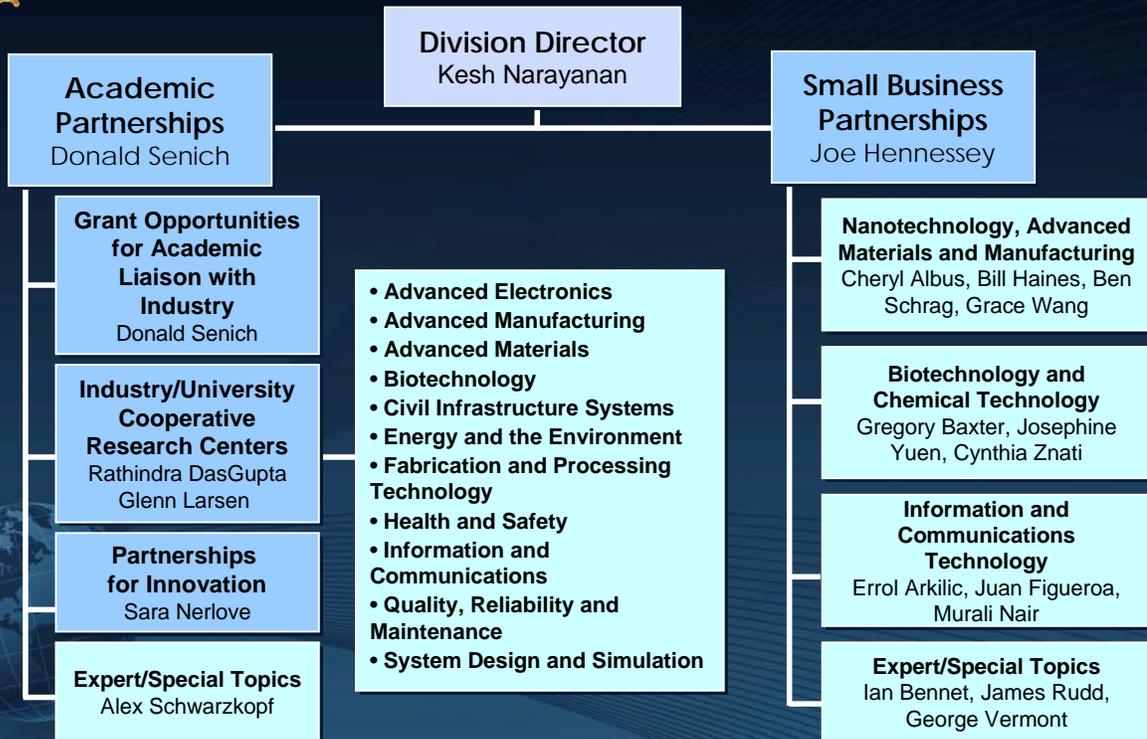


## Human Resource Development

- Research Experiences for Undergraduates (REU)
  - > Supports the involvement undergraduates in ongoing research programs or in research projects specifically-designed for the REU program
  - > \$10M/year available in engineering
  - > Deadline for site proposals in August each year
- Research Experiences for Teachers (RET) in Engineering
  - > Supports the active involvement of K-12 teachers and community college faculty in engineering research in order to bring knowledge of engineering and technological innovation into their classrooms
  - > \$4M/year available in engineering
  - > Deadline in November each year



# Industrial Innovation and Partnerships (IIP)



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## Grant Opportunities for Academic Liaison with Industry (GOALI)

- Promotes the transfer of knowledge between academe and industry, student education, and the exchange of culture
- Supports:
  - > Faculty and students in industry ( $\leq 1$  year)
  - > Industry engineers/scientists in academe ( $\leq 1$  year)
  - > Industry-university collaborative projects ( $\leq 3$  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

- I/UCRC 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 new 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 January and June; full proposals due in March and September



## 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 total 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
- \$25M for 170–250 awards
- Full proposals due in June and December



## 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 November 17, 2009



## Funding Opportunities

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



## Crosscutting and NSF-wide Opportunities

- 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](http://www.nsf.gov/funding/pgm_list.jsp?org=ENG)

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Advisory Committee  
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## Engineering (ENG) Active Funding Opportunities

Get ENG Program Annncmts & Info Updates by Email |  RSS  
 Get ENG Upcoming Due Dates Updates by Email |  RSS | [What is RSS?](#)

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

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

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



## Cyber-Enabled Discovery and Innovation (CDI)

- CDI is a five-year initiative to create revolutionary science and engineering research outcomes through 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
- ~\$40M investment in FY2008 for 36 grants
- Full proposals due February 4 and 5, 2010
- Advance information on FY 2010 solicitation at: <http://www.nsf.gov/pubs/2009/nsf09067/nsf09067.jsp>

**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 CPS 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 Feb. 26, 2010

**ENG Contact**  
Scott Midkiff



## 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 December; full proposals due January 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 Jan. 15, 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:
  - › 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
- Preliminary proposals due in February

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

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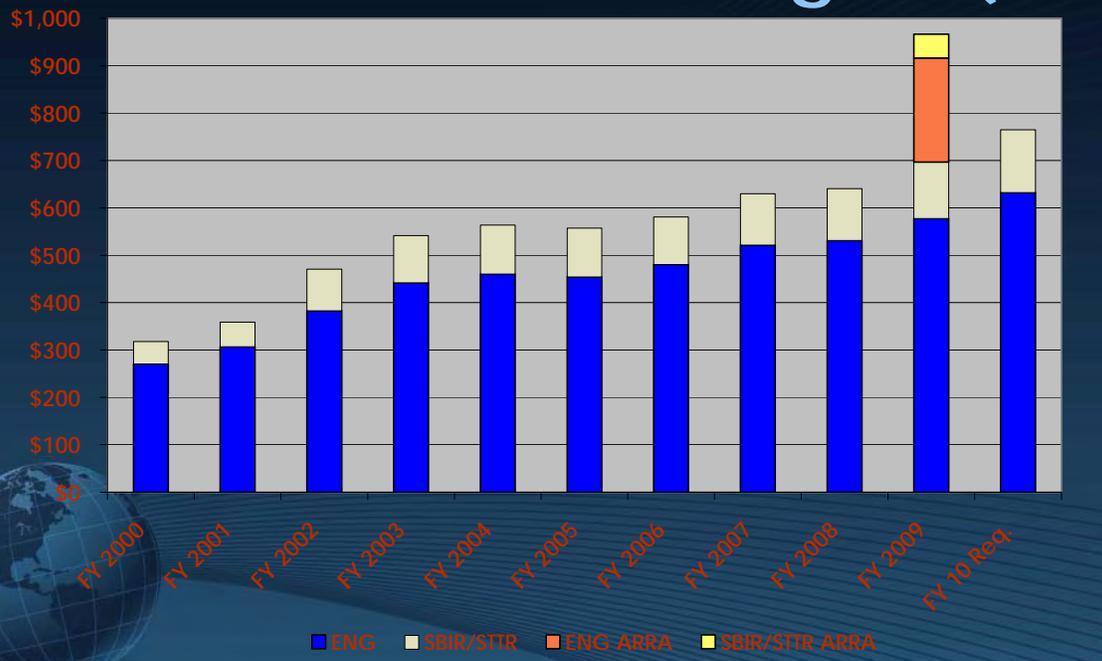


## What Do Reviewers Look For?

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



# ENG and SBIR/STTR Budgets (\$M)

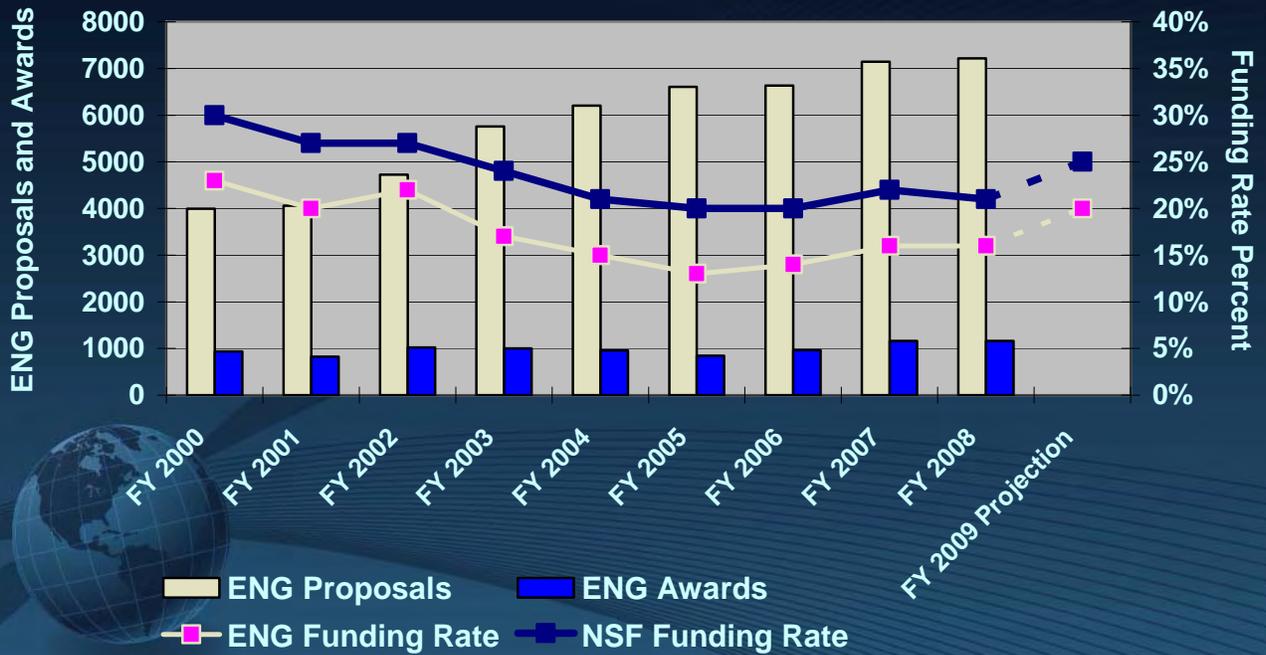


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# ENG Research Grant Proposals and Awards

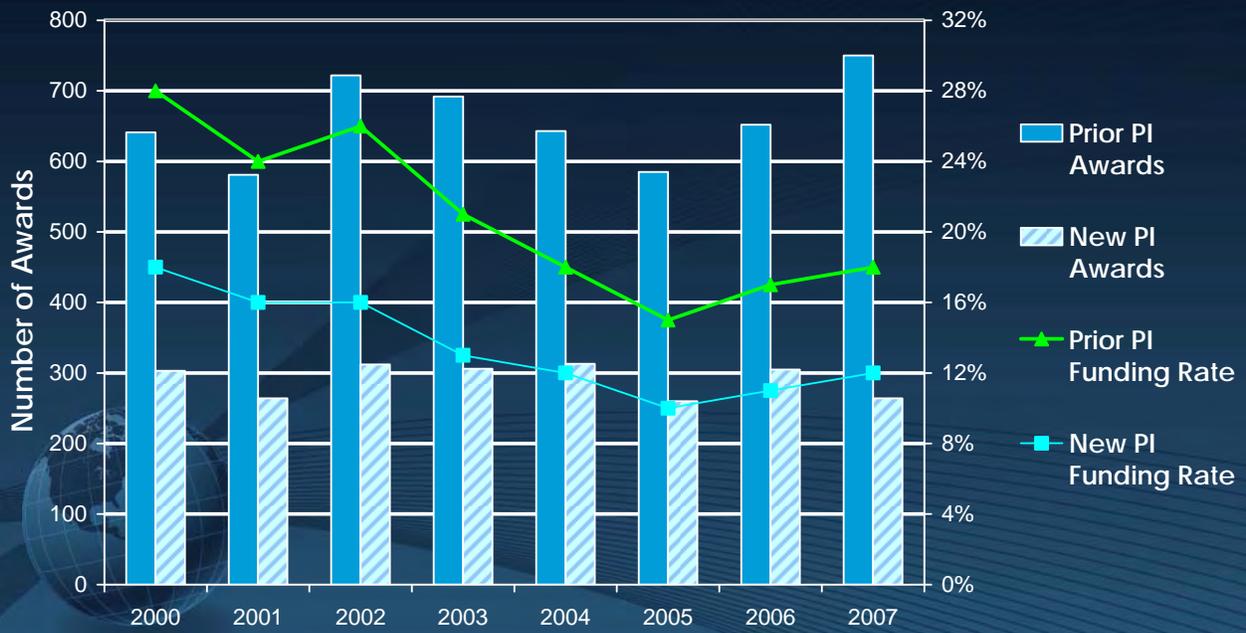


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# ENG Funding Rates for Prior and New PIs

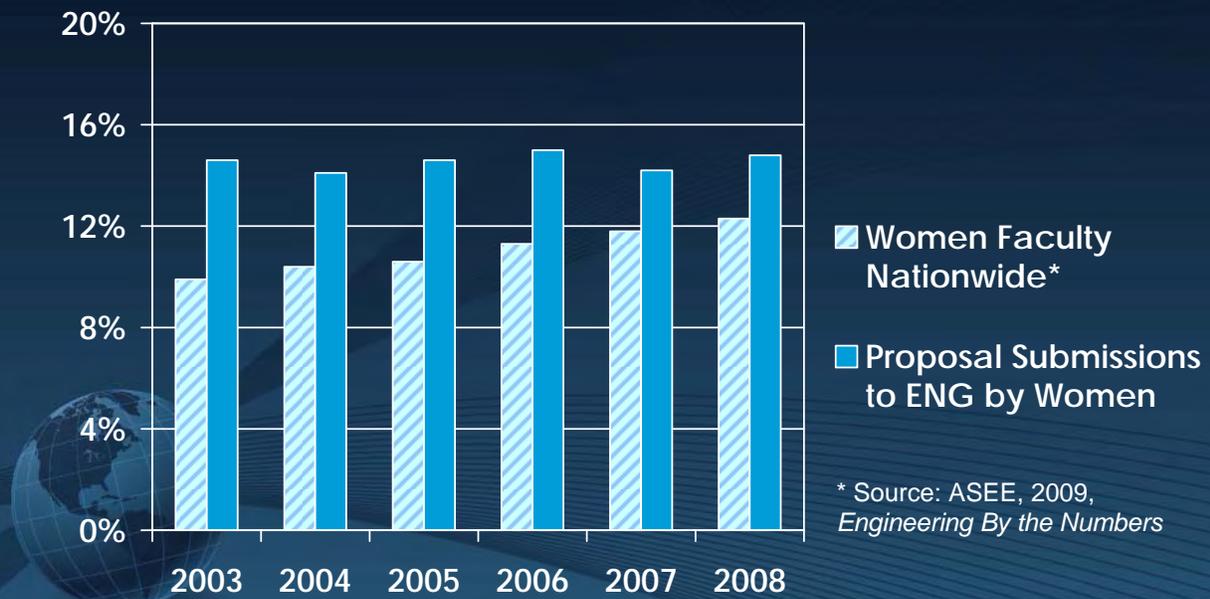


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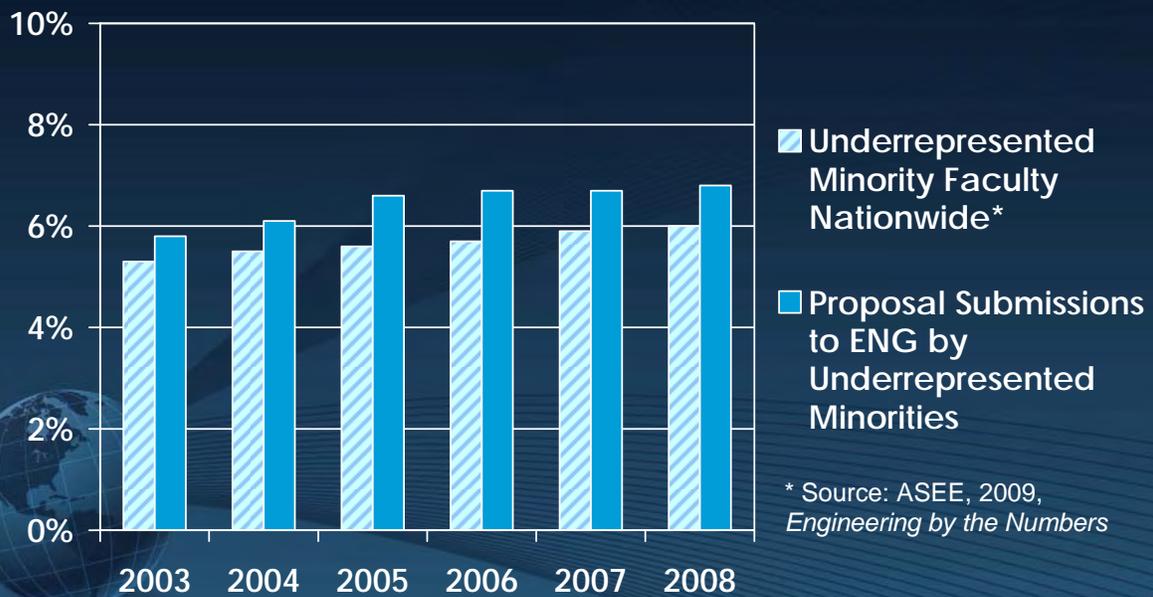
# Proposal Submissions to ENG by Women



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



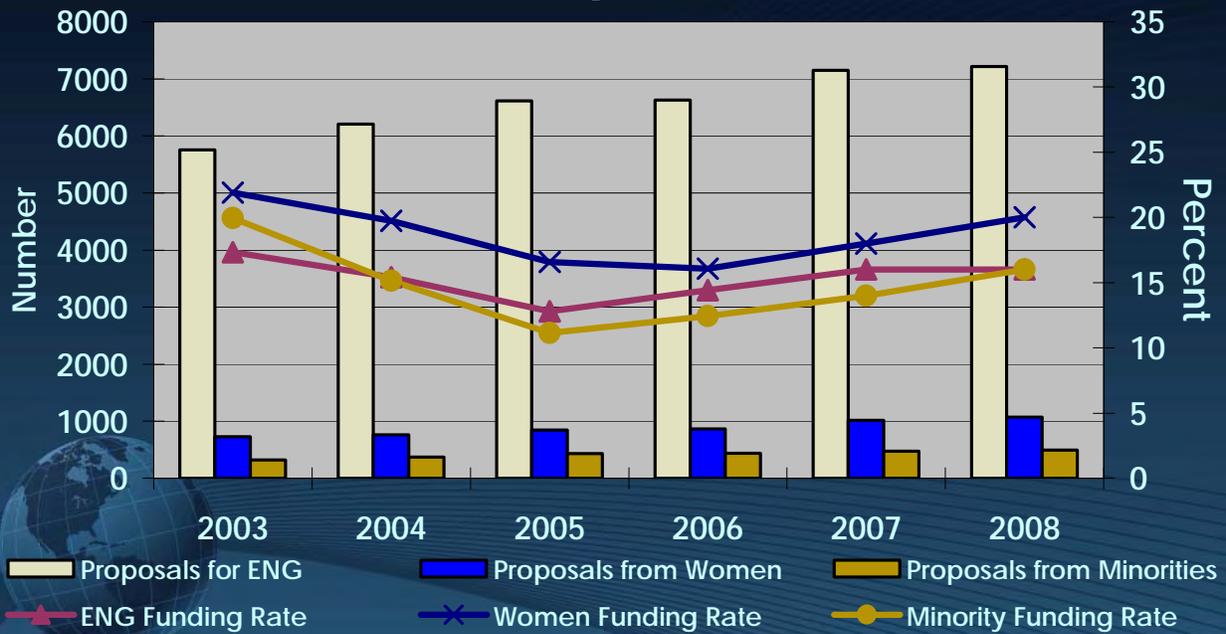
# Proposal Submissions to ENG by Underrepresented Minorities



\* Source: ASEE, 2009, *Engineering by the Numbers*



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

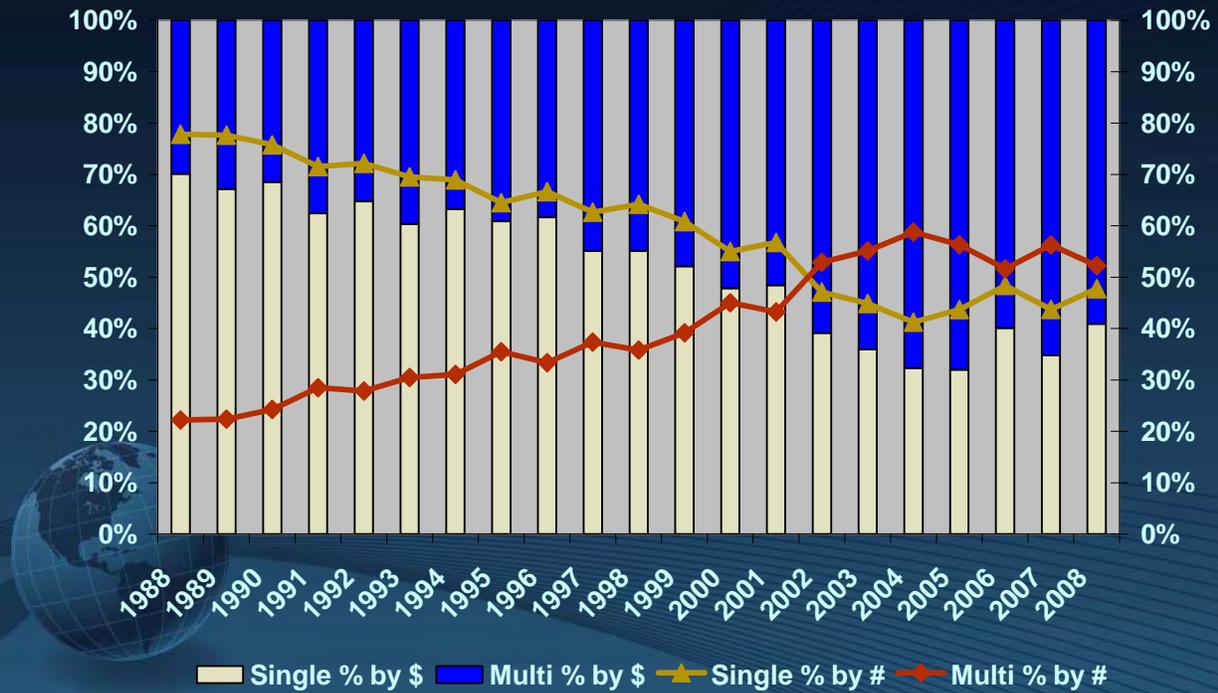


Directorate for Engineering

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# Single vs. Multiple Investigator ENG Awards



Directorate for Engineering

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## Resources

- ◉ Directorate for Engineering:
  - > **Bruce Kramer**, Senior Advisor and Program Director for Interdisciplinary and Cross-Directorate Programs, CMMI
  - > [bkramer@nsf.gov](mailto:bkramer@nsf.gov) and 703-292-5348
  - > <http://www.nsf.gov/eng>
- ◉ Funding Opportunities:  
<http://www.nsf.gov/funding/>
- ◉ NSF Email Updates: [www.nsf.gov](http://www.nsf.gov)