



Our World is **ENGINEERED**

Broadening Participation in Engineering

Dr. Omnia El-Hakim, Ph.D.
Director of Diversity and Outreach
NSF Directorate for Engineering
ENG Mentoring Workshop- Nov. 13,14/ 2009



What does the NSF do?

- As described in our strategic plan, NSF is the only federal agency whose mission includes support for all fields of fundamental science and engineering, except for medical sciences.
- We are tasked with keeping the United States at the leading edge of discovery in areas from astronomy to geology to zoology.

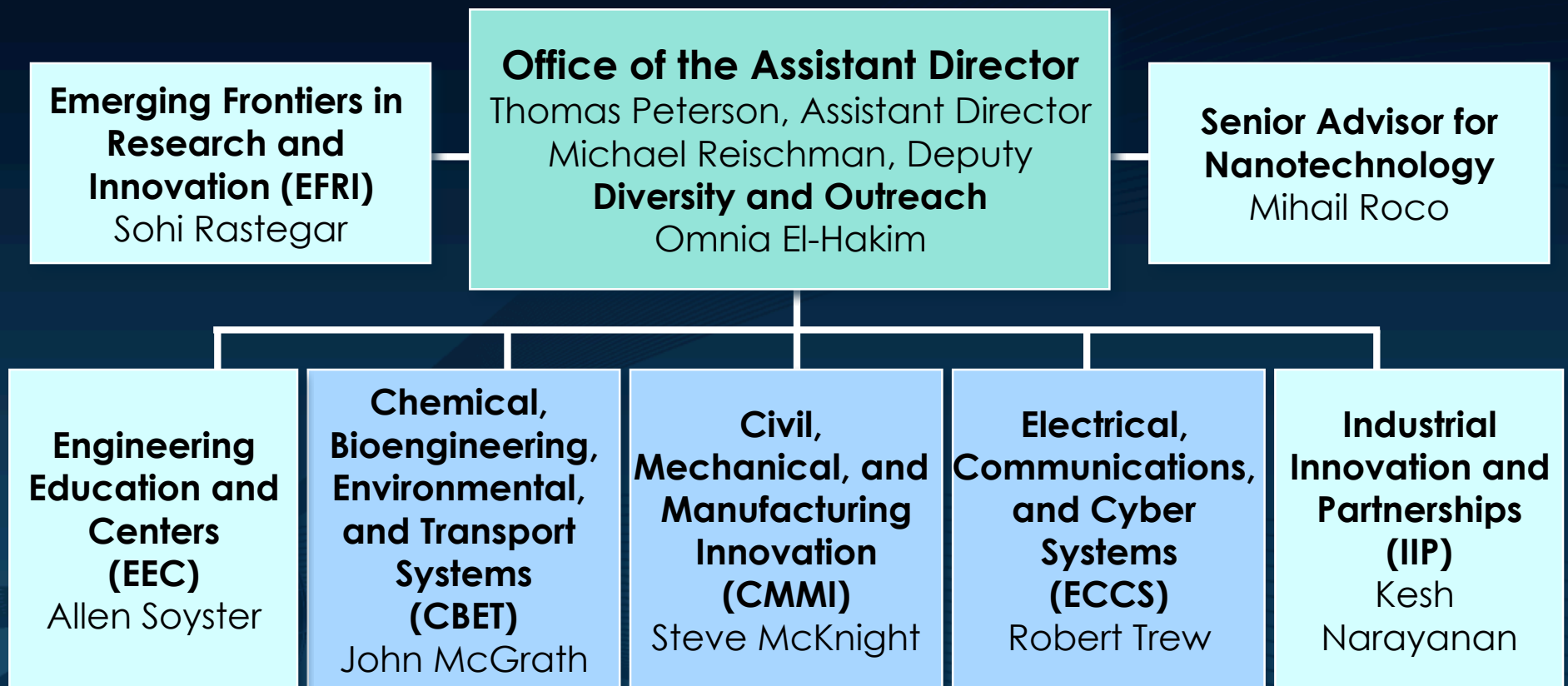


NSF Mission and ENG Mission

- ◎ **NSF Mission**: To promote the progress of science; to advance the national health, prosperity and welfare; and to secure the national defense.
- ◎ **ENG 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.



ENG Leadership





Broadening Participation at NSF

NSF committed to B.P. strategic plan via:

1. Prepared a diverse globally engaged STEM workforce.
2. Expanding efforts to B.P. from underrepresented groups and diverse institutions in all NSF activities.
3. Integrating research with education, and building capacity.
4. Improving processes to recruit and select highly qualified panels' reviewers.



What Do Underrepresented Groups Bring?

- ◉ Talents and skills
- ◉ Unique experiences
- ◉ Invaluable research approaches
- ◉ Creativity and innovation
- ◉ Excellence in diversity





Challenges

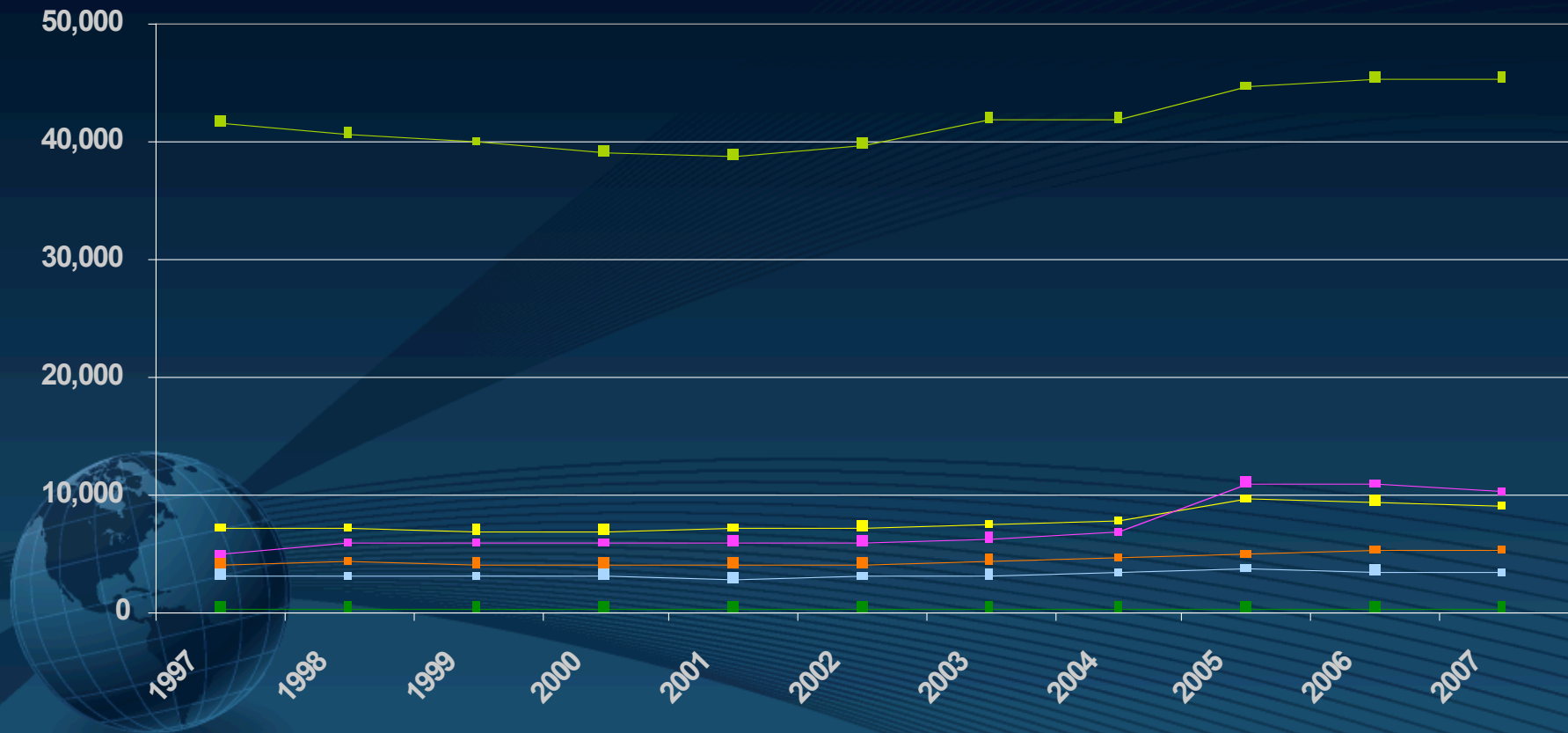
- ◉ Awareness
- ◉ Confidence and trust
- ◉ Cultural understanding
- ◉ Environment
- ◉ Facilities
- ◉ Opportunities
- ◉ Support





U.S. Demographic Data ENG BS Degrees Granted 1997-2007

— African American — Asian American — Hispanic
— Native American — White, Non-Hispanic — Foreign National & Other



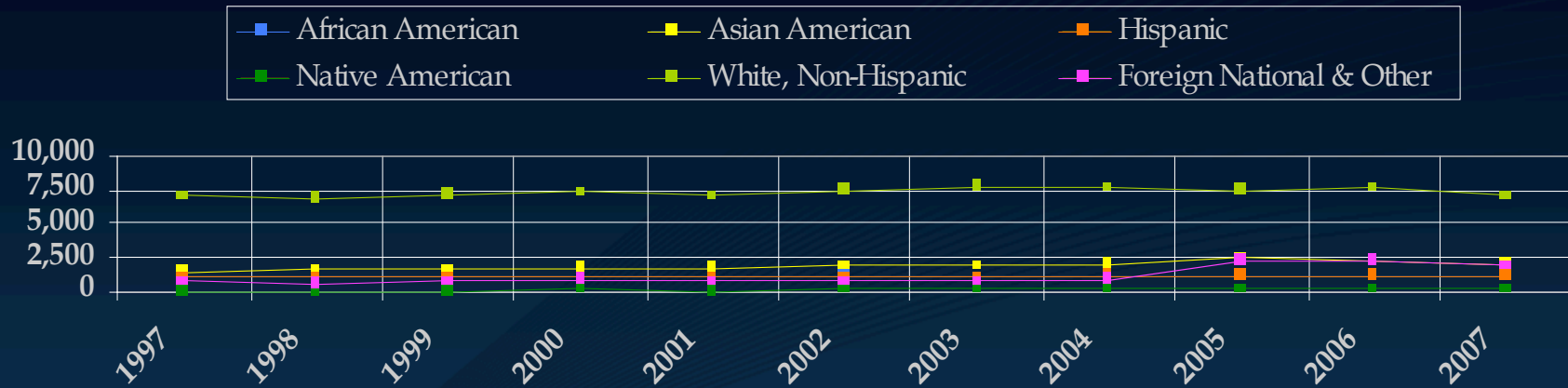
Data: NSF Science & Engineering Indicators; DoEd National Center for Education Statistics

Directorate for Engineering

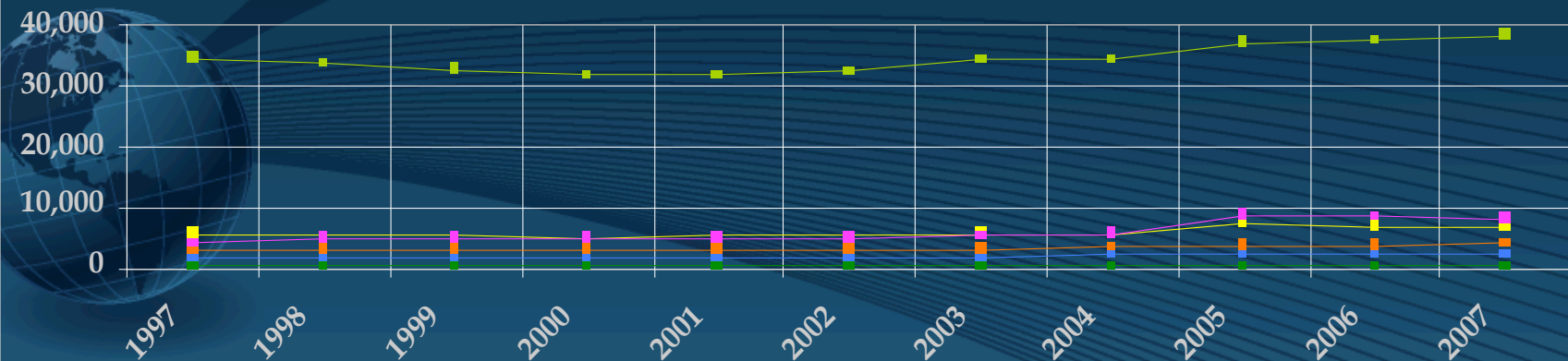


Degrees Granted (Gender)

Degrees Granted (Females) 1997-2007



Degrees Granted (Males) 1997-2007





Opportunities: Broadening Participation in Engineering

- Broadening Participation Research Initiation Grants in Engineering (BRIGE)
- Research to Aid Persons with Disabilities (RAPD)
- CAREER and REU
- ERC Diversity Plan
- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers
- Graduate Research Fellowships for Women
- Graduate Research Supplements (GRS)
- Diversity Workshops
- Programs for Native Americans



Broadening Participation Research Initiation Grants in Engineering (BRIGE)

- Opportunity to increase the diversity of researchers through research support early in their careers
- Encourages support of under-represented groups, engineers at minority-serving institutions, and persons with disabilities



BRIGE awardee Stephanie Luster-Teasley (L) and NC A&T students Desiree Gordon and Patrick Onochie discuss preliminary research for the development of controlled-release polymers for environmental remediation.



BRIGE Program (continued)

- ◉ For undertaking exploratory investigations, acquiring preliminary data, and/or developing collaborations.
- ◉ Include a plan showing how the proposed activities will increase:
 - Participation of engineers from underrepresented groups, and
 - The number of such individuals that serve as role models for the scientific workforce
- ◉ Funding for two years up to \$175K
- ◉ Success rate is 25% for 2008, and 31% for 2009

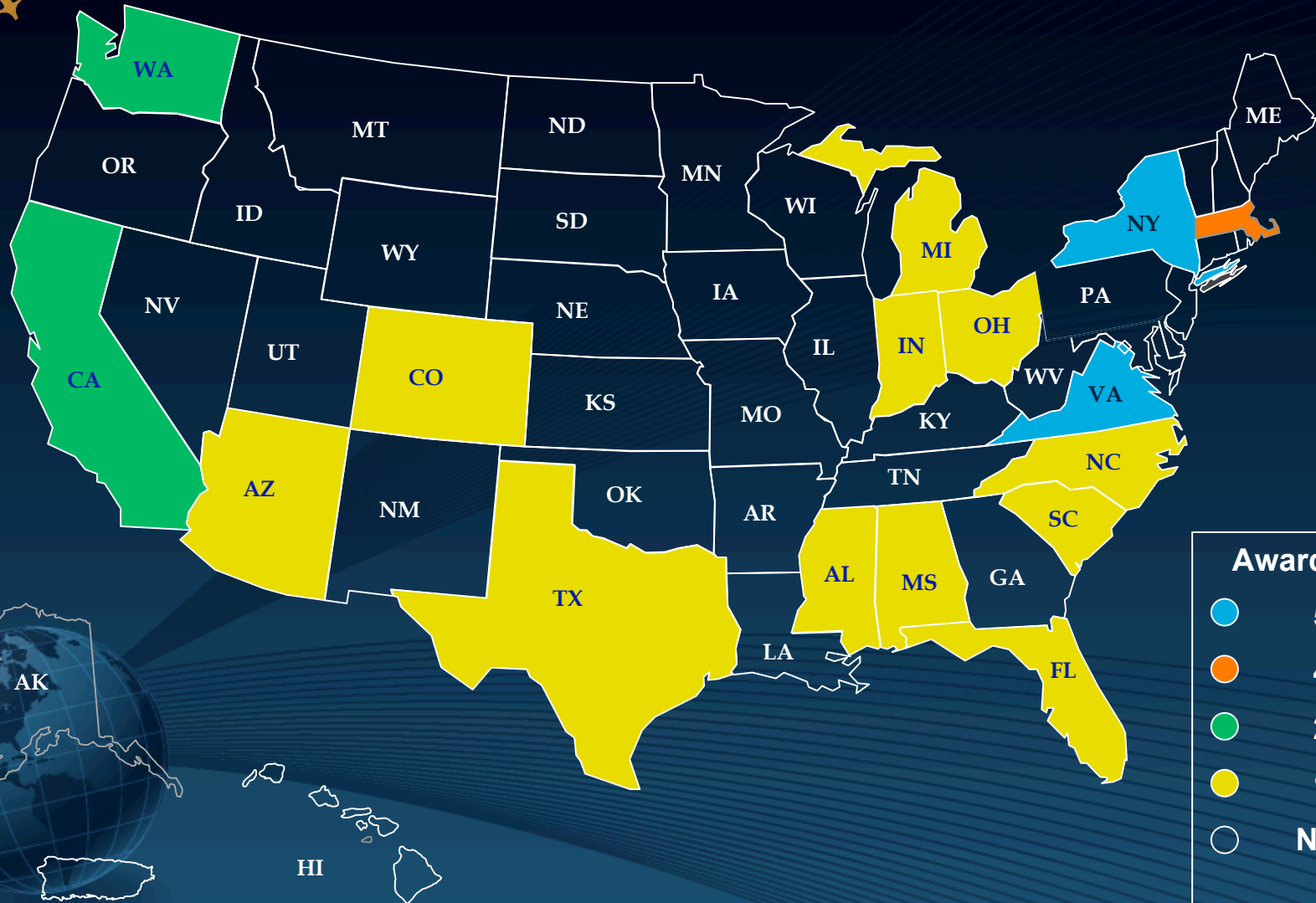


BRIGE Eligibility Requirements

- ⦿ Must be U.S. citizen or permanent resident
- ⦿ Hold a doctoral degree in an ENG supported discipline
- ⦿ Do not currently hold a post-doctoral appointment
- ⦿ Have held an active full time tenure-track faculty position or equivalent research appointment for less for less than three years
- ⦿ Have not previously served as PI or co-PI on research grants totaling more than \$50K



FY 2008 BRIGE Awards

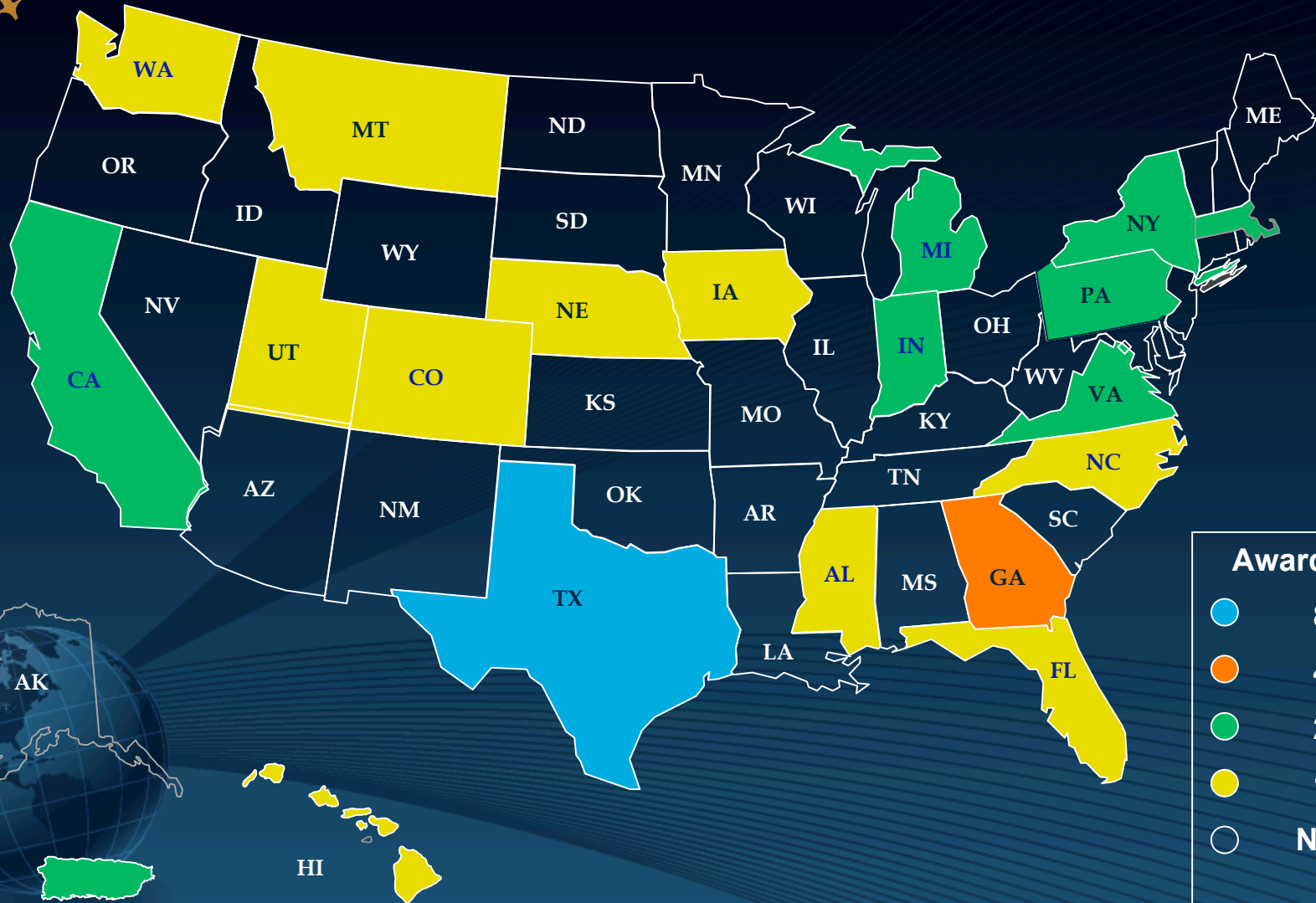


Awardees	
●	5
●	4
●	2
●	1
○	None





FY 2009 BRIGE Awards





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



CAREER is NSF-wide

- ◉ More than 200 programs across these Directorates review CAREER proposals
- ◉ More than 5,000 CAREER awards have been made since it began 14 years ago
- ◉ ~ 220 NSF Presidential Early-Career Awards in Science and Engineering (PECASE) have been awarded out of the pool of CAREER awardees





Graduate Research Supplement (GRS)

- ◉ Provides one year of support (up to three times) (~\$40K/year) for graduate study leading to research-based doctoral degrees
- ◉ Encourages women, members of under-represented minority groups, and persons with disabilities to apply
- ◉ Faculty request GRS via their existing grants
- ◉ ENG invests ~\$2M for ~50 awards per year
- ◉ ENG requests (see Dear Colleague Letter) due May of each year

GRS Contact
Omnia El-Hakim



Graduate Research Fellowship (GRF) Program

- Provides up to three years of support (~\$40K/year) for graduate study leading to research-based master's or doctoral degrees
- Encourages women, members of under-represented minority groups, and persons with disabilities to apply
- NSF invests ~\$67M each year for ~1 650 new awards
- ENG makes an additional 80 awards to women
- Deadlines vary by directorate;
ENG proposals due Nov. 12, 2009

GRF Contact
Gisele Muller-Parker



Human Resource Development

- Research Experiences for Undergraduates (REU)
 - > Supports the involvement undergraduates in meaningful ways in ongoing research programs or in research projects specifically-designed for the REU program
 - > \$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 in order to bring knowledge of engineering and technological innovation into their classrooms
 - > \$4M/year available
 - > Deadline in Nov. each year





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 Jan. 20, 2009; full proposals due Feb. 24, 2009

- **Institutional Transformation (IT)**

- > Systemic organizational approaches for institution-wide change
- > Letters of Intent due Aug. 4, 2009; full proposals due Nov. 12, 2009

- **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 Aug. 4, 2009; full proposals due Nov. 12, 2009



Tribal College Initiative

- **Goal:** To expand the engineering and pre-engineering capacities of tribal colleges and universities (TCUs) through curriculum development and partnerships.
- **Approach:** Develop a 3-year pre-engineering curriculum based on success-oriented student cohorts, distance education, relevant coursework and projects, and mainstream university participation.





Programs for Native Americans TCUP and PEEC

- Tribal Colleges and Universities Programs (TCUP) aims to enhance the quality of STEM instructional and outreach programs at Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions.
- Pre-engineering Education Collaboratives (PEEC) – new Implementation track supported by EHR/ENG
- PEEC supports pilot efforts in TCUP institutions to:
 - > Develop and/or enhance pre-engineering curricula
 - > Provide pathways from 2-yr colleges to 4-yr universities
 - > Provide internships, research experiences, and extramural learning opportunities; and faculty development
- 2–3 awards for up to \$1M per year (\$250K/institution) for up to five years



Research to Aid Persons with Disabilities (RAPD)

- RAPD supports research that will lead to the development of new technologies, devices, or software for persons with disabilities
- Award size: \$80K/year for up to three years
- Undergraduate Engineering Design Projects are also supported, especially those that provide prototype "custom-designed" devices or software for persons with disabilities (\$25K/year for up to five years)
- Proposals due Sept. 17, 2009 and March 3, 2010

RAPD Contact
Ted A. Conway



Engineering Research Centers

- ◎ ERC Core Objectives
 - > Create and sustain an integrated, interdisciplinary research environment to advance fundamental engineering knowledge and engineered systems
 - > Educate a globally competitive and diverse engineering workforce from K-12 on
 - > Join academe and industry in partnership to achieve these goals
- ◎ Currently 15 funded ERCs in 3 technology clusters
 - > Biotechnology and health care (5)
 - > Energy, sustainability and infrastructure (4)
 - > Microelectronics, sensing and information technology (6)



Industry Opportunities

- ◉ Grant Opportunities for Academic Liaison with Industry
- ◉ Small Business Innovation Research/Technology Transfer (SBIR/STTR)
- ◉ Centers (Industry/University Cooperative Research Centers, Engineering Research Centers, Nanoscale Science and Engineering Centers, etc.)





Small Business Innovation Research (SBIR) Programs

- ⦿ Encourages small firms to undertake cutting-edge research with the potential for significant economic and public benefits
- ⦿ Small business submits proposals (PI must be at least 51% time with the business)
- ⦿ 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.



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; 3-year awards for ~\$300K
- ◉ Proposals accepted anytime; ~70 awards each year





WIRES: Women International Research Engineering Summit

- ◉ Venue: Barcelona, Spain. June 2-4, 2009
- ◉ Theme: Enable sustainable research exchanges among female engineers in the world!





WIRES Outcomes

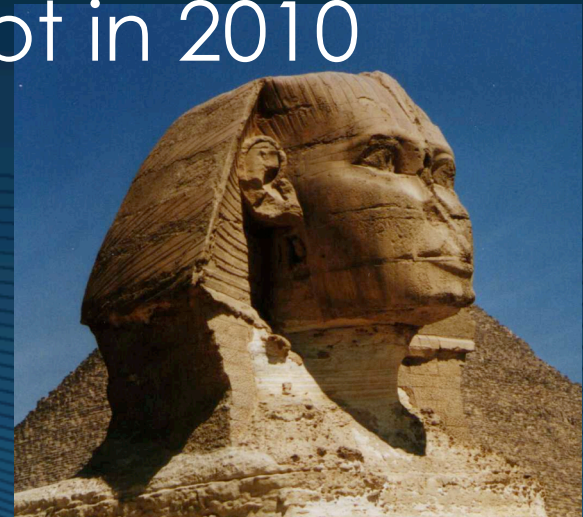
- 105 researchers from 23 countries (50 from U.S.) attended and showed posters
- Formed organizing committee for WIRES 2 Summit
- Several countries offered to host WIRES 2 Summit in 2011





Possible Future International Workshops

- ◉ Sustainable energy workshop in Turkey in 2010
- ◉ Renewable Energy: Wind engineering and Sustainable Infrastructures/ Green Buildings workshop in Egypt in 2010





Free Advice for Success...

- ⦿ Communicate with your program director
- ⦿ Pay attention to intellectual merit and broader impacts
- ⦿ Be a reviewer
- ⦿ Don't be afraid of research teams
- ⦿ Be innovative and think outside the box
- ⦿ Deliver on your promises
- ⦿ Seek feedback
- ⦿ Trust in yourself—don't ever give up



Resources

- ◉ Directorate of Engineering:

<http://www.nsf.gov/eng>

- ◉ Funding Opportunities:

<http://www.nsf.gov/funding/>

- ◉ NSF Email Update: www.nsf.gov

