



***Biomimetic*MicroElectronicSystems**



K-12 and Higher Education: Why Collaboration is Vital

NSF STEM Smart Plenary Presentation
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ERC Education Core Mission

The education mission of the ERC Program is to:

- Impact and augment engineering curricula at all levels, from precollege to life-long learning, with educational materials derived from ERC research.
- Produce graduates who will be adaptive, creative innovators in a globally connected, innovation-driven world
- Increase the diversity of the STEM workforce by including all members of society, regardless of race, ethnicity, or gender, in all aspects of the centers' activities.
- Integrate research, education, diversity, outreach, and industrial collaboration
- View ERC as change agents for academic engineering programs and the engineering community at large.



NSF's FY 2013 Engineering Research Centers

(Lead institutions)

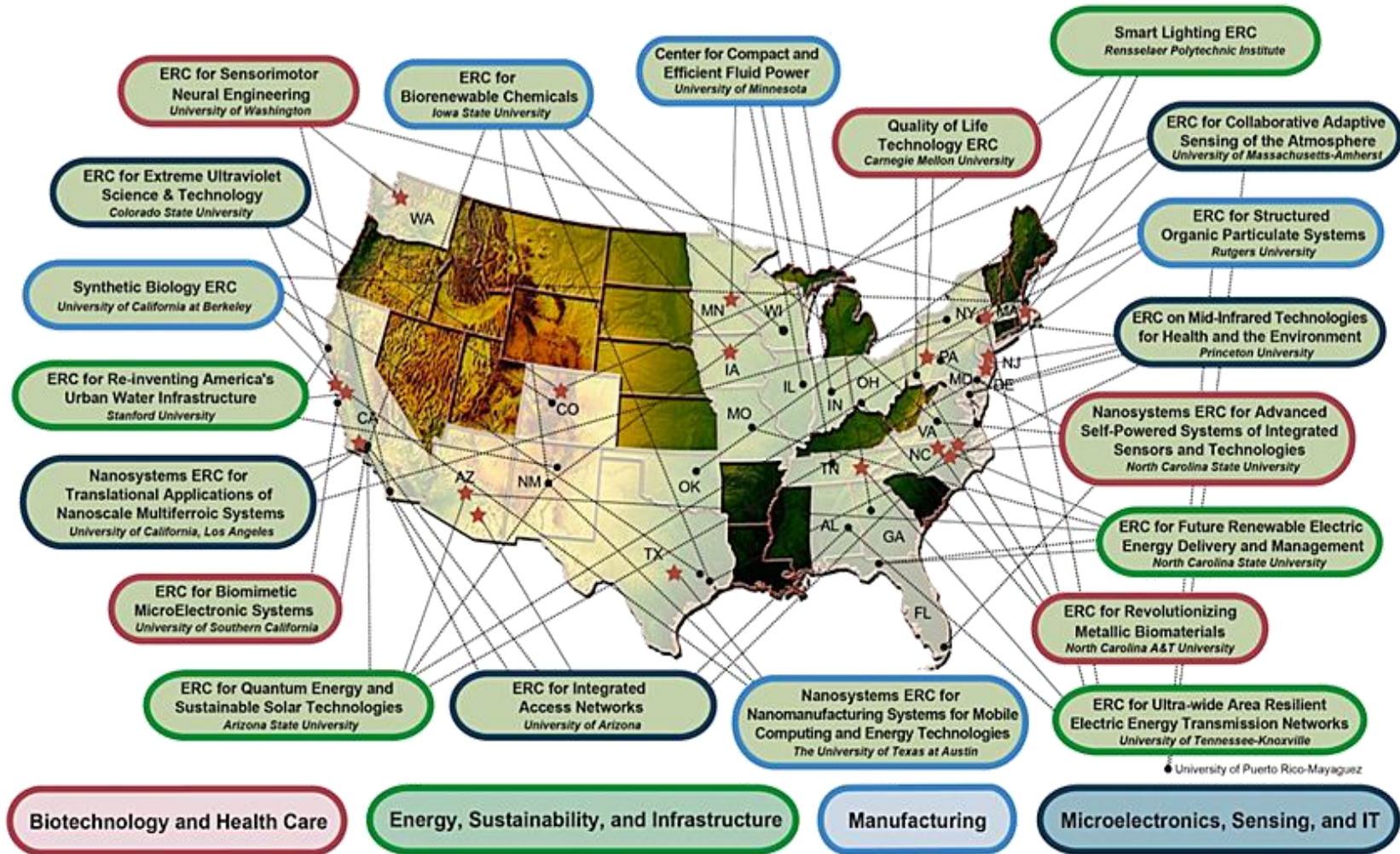


Note: All centers are multi-university partnerships, university shown is lead institution.



NSF's FY 2013 Engineering Research Centers

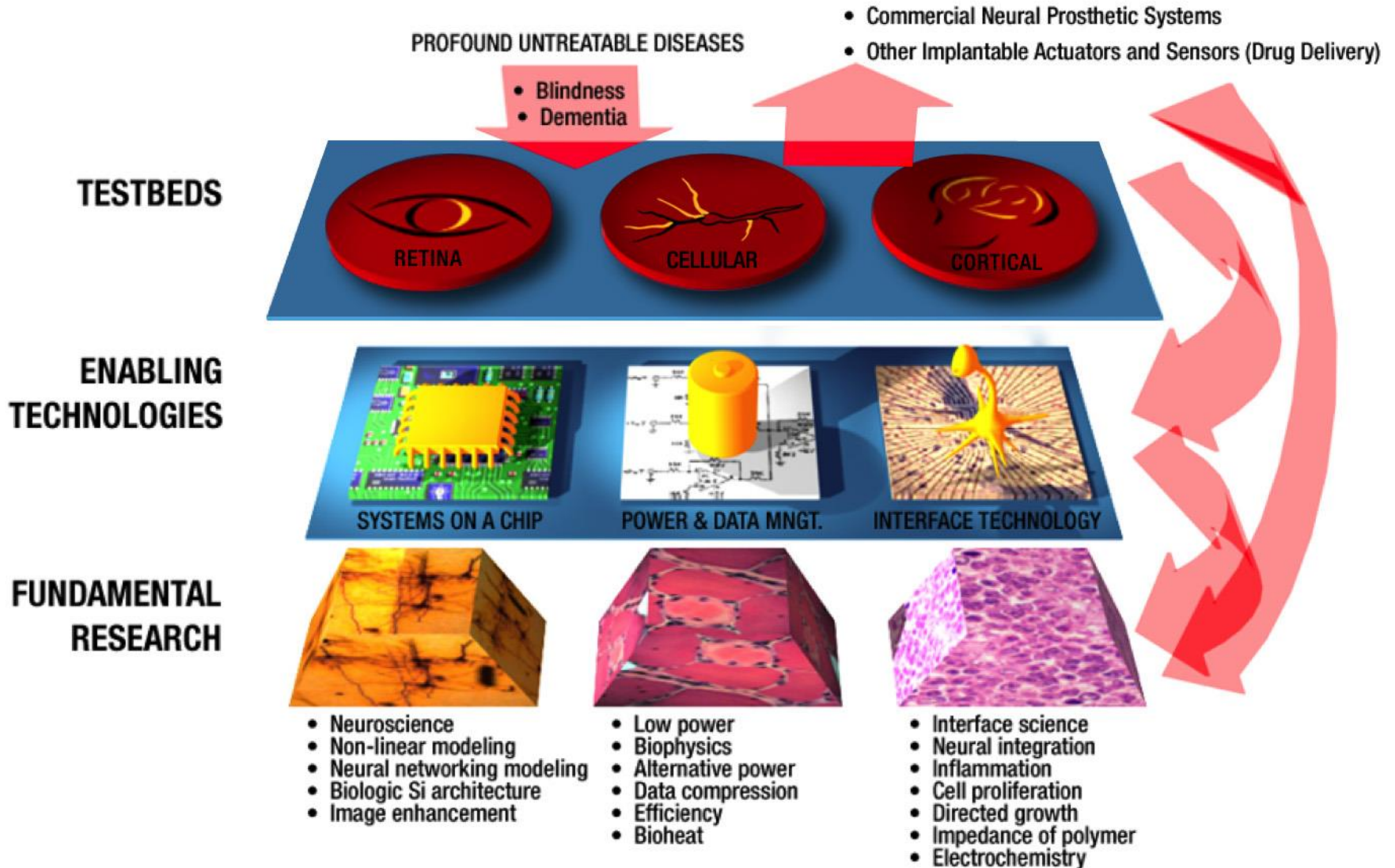
(Lead institutions and core partners)



Note: All centers are multi-university partnerships; university shown is lead institution.



BMES ERC Strategic Plan



Hallmarks of a Partnership

Key Components of a Successful Partnership

- Mutually beneficial
- Built on strengths and resources of partners
- Target specific populations and associated needs (needs assessment)
- Realistic and clearly identifiable goals and timelines
- Measurements of progress and success
- Cognizance of institutional cultures
- Dedicated key personnel
- Identified roles and expectations of personnel (job descriptions)
- On-going evaluation and assessment
- Continuous communication
- Long-term



The BMES ERC STEM Pipeline

In recognition of the importance of early education intervention, the BMES has leveraged its considerable resources and talents to establish a robust K-16 STEM pipeline.

BMES ERC STEM Pipeline:

- Elementary School
 - Students and Teachers
- Middle School Program
 - Students
- High School
 - Students, Teachers and Counselors
- Informal Educational Experiences
 - Students, Extended Families and Educators
- Summer Research Programs
 - High School Students and High School and Community College Teachers



Elementary School Outreach

Science for Life (SFL)

- Modular science and engineering curricula
- Focused on BMES ERC research
- In-the-classroom instruction
- Mentors/role models (1 USC : 1 HS : ~10 MS students)
- Formative and Summative Assessments



High School Outreach

Engineering for Health Academy (EHA)

- Small Learning Community with a focus on Biomedical Engineering
- Multi-year course of study (3 years, 4 core courses, Capstone Class)
- Science Fair projects each year
- Mentoring component (USC BME undergraduate and graduate students)
- College admissions preparation
- Longitudinal study of students



Informal Educational Experiences

- **Science and Engineering Fairs**
 - Students defend projects to university/industry judges
- **Discovery Science Family Day**
 - Teaching parents about the science and engineering curriculum their children are learning through hands-on activities
- **Middle School Events**
 - Shadow EHA scholars, Q&A panels with USC/HS researchers and students and ERC Lab Tours
- **University Field Trips**
 - Includes admission presentations and engineering department information sessions, tour of ERC labs
- **Science Parent Workshops**
 - Elementary school parents are exposed to STEM through “workshops of interest”



Summer Research Programs

Summer High School Advanced Research Program (SHSARP)

Participants are:

- rising 11th graders from throughout greater LA region
- integrated into on-going research projects at USC
- immersed into research culture
- mentored by USC students and postdocs
- develop and practice soft skills
- expected to present a seminar and write a paper
- paid a stipend



Research Experience for Teachers (RET)

Teachers:

- are high school and community college teachers
- learn about cutting edge research
- receive curriculum development in translating lab experiences into classroom activities that address NGSS and SLO and have authentic assessment components
- participate in academic year follow-up activities
- are encourage to form long-term partnerships between partnering institutions
- create final presentation, paper and dissemination plan



Building K-12 and University Partnerships

For more Information, please visit:

<http://www.erc-assoc.org>

<http://bmes-erc.usc.edu>

<http://viterbi.usc.edu/k-12/programs/>

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