National Academy of Engineering Regional Meeting:
"Engineering for Impact: Effecting Sustainable Change in the Developing World"
offered in conjunction with
The De Lange Conference VIII: "The Future of the Research University in a Global Age"

February 28, 2012
12:00 p.m. – 6:00 p.m.
Bioscience Research Collaborative, Rice University
Houston, Texas

NAE Organizing Committee: **David Hellums**, A.J. Hartsook Professor Emeritus at Rice University; **Fazle Hussain**, Cullen Distinguished Professor of Mechanical Engineering at the University of Houston; **Rebecca Richards-Kortum**, Stanley C. Moore Professor of Bioengineering at Rice University; **Pol Spanos**, Lewis B. Ryon Professor of Mechanical & Civil Engineering at Rice University; **Ned Thomas**, William & Stephanie Sick Dean of Engineering at Rice University

Register at www.rice360.rice.edu.

12:00 p.m. NAE Members' Lunch & Meeting **(members only)**
Chaired by ***Charles Vest***, President, National Academy of Engineering

1:45 p.m. **Welcome remarks** by ***Ned Thomas***, Dean of the George R. Brown School of Engineering, Rice University

1:50 p.m. **Welcome remarks** by ***Charles Vest***, President, National Academy of Engineering

2:00 p.m. ***David Edwards,*** Gordon McKay Professor of the Practice of Biomedical Engineering, Harvard University

CellBags, WikiCells, and Breathable Healthcare for the Developing World
Over the last five years, we have been exploring a new innovation model for sustainable change driven by art and design experimentation at frontiers of science. In this model, driven by organizations in Paris, France, and Cambridge, Massachusetts, sustainability derives from value contributed during the experimentation in educational, cultural, commercial and humanitarian contexts. Resources invested to generate these various kinds of value combine to propel idea development with local integration and inherent sustainable models. Three specific ideas will be described, one related to breathing nutrients into the mouth, and not into the lungs, and its relevance to developing world health and notably the problem of anemia. The other two projects derive from the notion that the biological cell can give us insight into how to design ways to better transport and consume water. The CellBag is a handbag/gourde with multiple benefits related to carrying large amounts of water. The CellBag emerged out of a Harvard classroom, and is now being used in a rural community in South Africa and sold in Paris. Sale of the product in the developed world sustains use in the developing world and is the basis of plans

for a South African company to further develop and commercialize the CellBag. WikiCells are another technology that spun out of the early Harvard project. WikiCells are a technology for creating "edible bottles," essentially biological forms for packaging drinks and food. WikiCells can be produced locally and inexpensively and decrease the use of oil-derived plastics.

2:40 p.m. ***Henry Yang,*** Chancellor and Professor of Mechanical Engineering, University of California, Santa Barbara

Engineering a Brighter Future for the Developing World
This discussion will explore how innovative directions in research are expanding opportunities to effect sustainable change in both the developed and developing worlds, and will describe interdisciplinary collaborations that are driving advances in energy efficiency, sustainable lighting, renewable energy, wireless networking, and more. The presentation will invite audience feedback on how these technologies and ideas can be applied in the developing world to create a better quality of life for all members of our global society.

3:20 p.m. **Coffee Break**

3:45 p.m. ***Michelle Adler*****,** PMTCT Technical Advisor, Division of Global HIV/AIDS, Centers for Disease Control and Prevention

Ingenious Impact: Partnerships to Move Prototypes to Practice
Low-cost technologies are critical to providing quality prevention, care, and treatment in resource limited settings. University programs that foster student ingenuity offer important opportunities for designing and piloting prototypes. This presentation will provide illustrative examples of how partnerships between university engineering programs and international organizations can facilitate the development and refinement of highly effective, low cost technologies. For these technologies to have impact they need to be recognized internationally and investment must be secured to develop and distribute them on a large scale. Creative partnerships with public and private sectors in areas such as production capacity, marketing, and regulatory approval have paved the way for successful adoption of technologies into health programs worldwide.

4:25 p.m. ***Paul Yock,*** Martha Meier Weiland Professor of Medicine and Bioengineering; Director Biodesign, Stanford University

Setting the Stage for Collaborative Innovation in Global Medtech
We are in the early stages of an historic shift in medical technology innovation in which global developing economies will play a critical role. The markets for medical technologies are expanding much more rapidly in the BRIC countries than in the West, particularly China and India. The dynamics of these markets are spawning new technologies with a much lower cost profile than in the U.S. or Europe. At the same time in America we have entered a "perfect storm" for medical technology innovation, with increased regulatory barriers, uncertain reimbursement reform and diminished venture funding combining to slow the

rate of new technology introduction here. One positive aspect of this situation for America is the potential for a "virtuous cycle" of low-cost innovation -- that is, more affordable technologies developed for markets abroad will enter the U.S. market... which in turn will help force a new emphasis on cost effectiveness for products developed here.

5:05 p.m. **Closing Remarks** by ***George McLendon***, Provost, Rice University

5:10 p.m. **Wine and cheese reception**