Report from ECCS Committee of Visitors 2008

Dr. Cherri Pancake (COV Chair)

ENG AdCom Meeting

October 15, 2008

ECCS COV-2008 Members

- Susan Allen, Arkansas State U
- B. Ross Barmish, U Wisconsin
- Karen Butler-Purry, Texas A&M U
- Steve Castillo (Co-chair), New Mexico State U
- Ralph Cavin, Semiconductor Research Corp.
- Gilber Hawkins, Kodak Research Labs
- Kenneth Marko, ETAS
- Lynne Molter, Swarthmore C
- Carlo Montemagno, U Cincinnati
- Cherri Pancake (Chair), Oregon State
- Martha Pardavi-Horvath, George Washington U
- Martin Schmidt, MIT
- David Seiler, NIST
- Kang Want, UCLA
- Brian Woerner, West Virginia U

Visit Organized a Little Differently

- Process structured around report format
- Each COV member evaluated jackets in advance using online system
  - Sent comments addressing first half of report
  - Chair collated, identified issues/questions, and circulated written draft response – prior to meeting
- Breakouts addressed report sections (ECCS wide, rather than by program)
  - Statistics had been pulled in advance, organized by relevance to sections, and explained in non-jargon
  - Subgroups analyzed statistics, identified further questions, and drafted report sections
- Full group discussed & refined drafts

Findings: Program Processes

- Review processes good
  - 93-95% subject to panel review
  - Reviewers qualified and typically thorough
- Decision process
  - Documentation provides rationale for decisions
  - Time-to-decision is outstanding *special kudos!*
    - NSF goal is 70% within 6 months
    - ECCS achieves 98% (top division in NSF in 2006, 2nd in 2007)Average dwell time of just 4.78 months

Findings: Award Portfolio

- Balance – *numbers are from FY07*
  - Appropriate mix of innovative and evolutionary projects
  - Excellent record of inter/multidisciplinary awards
    - 44 of 259 awards had funding from other groups
    - ECCS also contributed to 75 in outside programs
  - Excellent record for multi- and new-investigator
    - 111 of 259 awards had multiple investigators
    - 31% went to new investigators
- Quality is high, with clear relevance to national and NSF priorities

Findings: Management

- DD has done good job of implementing NSF's organizational excellence goal
- POs efforts have been efficient and successful
- Proactive response to changing/emerging opportunities
  - NSF initiatives
  - Emerging thrusts from the community
  - Bottom-up identification of emerging areas
- Strong management of NNIN, NCN, and PTAP on behalf of NSF
- Initiated Graduate Research Supplements – now adopted ENG-wide *special kudos!*

Management (2)

- Impressive track record in leveraging investments through joint programs with other programs/agencies *special kudos!*
- Diligent in following up on all issues COV identified
  - Improved funding rate for CAREER awards
  - Improved rate and review process for SGER
  - Reorganization addressed concerns about disciplinary breadth
  - Improved instruction of reviewers on importance of responding to broader impact
  - Attempts to track and increase reviewer diversity
  - Improvements in following up on GOALI program

Results of NSF Investment: Discovery

- Many examples of ground-breaking research
  - ECCS priorities align with ACI and NAE Grand Challenges
  - COV especially impressed by interdisciplinary breakthroughs (e.g., nanoelectronics + bio systems)
- Report highlights examples that will
  - Make low-cost, highly sensitive NMR available in the mass market
  - Complement and eventually replace traditional microelectronics with devices utilizing electron spin
  - Reduce power requirements and increase device portability
  - Exploit organisms' methods to achieve energy efficient locomotion and maneuvering

Results of NSF Investment: Learning

- ECCS invests in broad spectrum of activities
  - Undergrad and grad education, teacher training, K-12 programs, and outreach to the general public
- Report highlights examples that
  - Get primary school students enthusiastic about nanotechnology through an interactive webzine
  - Involve undergrad and grad students in wireless monitoring of water quality
  - Give K-12 teachers/students from disadvantaged households hands-on experience with optics, photonics, and RF engineering
  - Have introduced 1,000+ Hispanic professionals and 500+ students to experiments on power quality and energy

Results of NSF Investment: Infrastructure

- ECCS meets this goal primarily through its management of largescale facility networks
  - NNIN provides nanoscale fabrication, modeling, and synthesis capabilities for over 4,500 users
  - PTAP allows university faculty and students to acquire pre-commercial photonic devices for purposes of research and instruction
  - NCN gives worldwide students & faculty access to simulation and modeling capabilities
- Report also highlights a smaller project
  - Develop an optoplasmonic nanoscope that will make it possible to investigate in-vivo cell dynamics and single-molecule protein reactions

Overall Assessment

- ECCS has been highly successful in meeting its program goals and objectives
- Division processes are carried out with care and integrity
- Programmatically, ECCS plays a pivotal role
  - All NSF's targeted challenges (SEBML, WATER, AST, CDI, NNI) will require groundbreaking technological developments in ECCS domains
    - Electronics, photonics, controls, adaptive networks, complex systems, low-cost power
  - ECCS research will be instrumental in addressing many of NAE's Grand Challenges

Key Concerns of COV

- Because funding is limited, ECCS doesn't always have deep coverage
  - Risk that important topics might be under-invested
  - Impact will be felt by NSF's new initiatives and NAE's Grand Challenges
- Where topics are covered, award size lags behind research costs
  - Annual award size significantly lower than ENG and NSF averages ($107K vs $116K and $144K)
  - Constrains effectiveness of PIs – and will have long-term detrimental effects

Action Is Needed

- Problem has been worsening
  - Last COV (2005) criticized both award size and rate of funding
  - In response, ECCS made concerted attempt to improve funding rate
  - Meanwhile, non-fenced portion of ECCS budget decreased – to lowest in ENG (42% in FY07)
- Most proposal budgets are renegotiated prior to funding
  - Decreases in allocatable budget made it necessary for ECCS to reduce award size
  - 80-85% of PIs now required to cut their budgets up to 40%, prior to receiving the award

Action Is Needed (2)

- COV has grave concerns about the effectiveness of underfunded research
  - Especially in experimental areas, where project impact may depend on availability of expensive equipment and facilities
  - Bottom line: Can't continue relying on community to subsidize underfunded projects
- COV unanimously supports the need to increase uncommitted funds for ECCS
  - Urges ENG to rethink the implications of its planned ECCS allocations
  - If uncommitted funds do not increase, ECCS must take action to cut back funding rate

Special Thanks

- Members of the COV
- Dr. Usha Varshney, ECCS DD
- ECCS Program Officers
- ECCS Science Assistants and Staff