CPATH

CISE Pathways to Revitalized Undergraduate Computing Education

Joseph Urban

CISE/CCF

Deadline was January 2007 -- stay tuned for next solicitation!

Outline

- CPATH History
- 2007 Awards Summary
- Impact
- Challenges
- Future/Opportunities
- Points of Contact
- SRS

CPATH History

- ICER workshops for public input in 2005 and 2006
- CPATH program announced in September 2006
- First competition just completed
  - 141 proposals, 118 projects
- 27 projects funded
  - $6M CPATH funds
  - $5M Educational opportunity/special project funds
- More comprehensive evaluation added to 10 projects to be involved in quasi-experimental programmatic evaluation led by external evaluator

These were the foci in 2007 -- stay tuned for next solicitation!

Overview of Four Types of CPATH Projects

Community Building (CB)	**CB** awards support efforts that bring stakeholders together to transform undergraduate computing education
CISE Distinguished Education Fellows (CDEF)	**CDEF** awards recognize outstanding individuals committed to leadership in the transformation of computing education and support them to explore new ideas and disseminate results
Evaluation, Adoption, and Extension (EAE)	**EAE** projects are meant to build on EXISTING examples of innovative educational approaches
Institutional Transformation (T)	**T** grants support implementation of innovative, integrative models for undergraduate computing education that have potential to serve as national models

Some details …

Community Building Awards

19 projects including 4 collaboratives

- Preparing students for computational thinking in the workplace (Purdue University, North Carolina State University)
- Building community around “studio-based” learning model adapted from architectural education
  (Washington State University/Auburn University/University of Hawaii)
- Inspiring students through computing and the arts (University of Massachusetts Lowell, Chapman University, Wake Forest University)
- Linking with local and national industries
  (Los Rios Community College, Governors State University, Michigan State University)
- Preparing students to work and lead in an international global economy
  (University of Oregon Eugene/Portland State University)

CPATH Impact

- Raised the national consciousness about transformation of computing education
- Reached large number of geographic areas and institution types
- Established collaborations with many disciplines to foster new pathways that will broaden the scope of undergraduate computing

CPATH Challenges

- National outreach
- Dealing with K-12 issues and community
- Working with and dealing with professional societies, particularly ABET
- Moving beyond curricular revision ideas to institution transformation models – avoiding incremental changes
- Encouraging researchers to be involved in educational efforts and fundamentally linking research and educational efforts

More Challenges

- Blurring traditional boundaries and models of practice
- Future funding for larger implementation projects
- Collaborations with industrial partners and international efforts
- Developing leaders to sustain communities
- Changing the image of computing across the nation

Cognizant Program Officers

- **Harriet Taylor,** NSF CISE/CNS Room 1175.13, telephone: (703) 292-7973, email: htaylor@nsf.gov
- **Sylvia Spengler**, NSF CISE/IIS Room 1125 S, telephone: (703) 292-8930, email: sspengle@nsf.gov
- **Joseph Urban**, NSF CISE/CCF Room, 1115, telephone: (703) 292-8910, email: jurban@nsf.gov

Conclusion

- Off to a good start – have raised awareness around the nation (e.g., Google Faculty Summit)
- Importance to American competitiveness – an essential link to make
- Timing – perhaps now is the right time, achieving buy-in that was not possible before

CISE must lead the way in linking research and education in computing disciplines

Software for Real-World Systems

- Software is a critical element of real-world systems
  - Micro- and nano-scale embedded devices
  - Global-scale critical infrastructures (e.g., communications, transportation, health care, enterprise systems)
  - Cyber-physical systems
  - Networked and distributed systems
- Emerging technologies offer key challenges
  - Multi-core processors
  - Mobile and pervasive technologies
- Yet, the **science** and **engineering** remain elusive and poorly understood for designing and building the software that will govern the essential behaviors and properties of real-world systems
- **How can software for real-world systems be designed, built, and analyzed in elegant and powerful new ways?**

Research Innovations

- SRS proposals must innovate in at least two of the following:
  - **What are the scientific principles for creating and analyzing software for real-world systems?**
  - **What are the most effective engineering processes and methods for designing, building, and analyzing software for real-world systems?**
  - **What new educational ideas and activities are needed to support the learning and application of scientific principles and engineering methods for the design, construction, and analysis of software for real-world systems?**

CPATH

CISE Pathways to Revitalized Undergraduate Computing Education

Questions?