State of NSF and CISE

Jeannette M. Wing

Assistant Director
Computer and Information Science and Engineering

NSF, May 2, 2008

Outline

- NSF news
- CISE
  - Budget: FY08, FY09, FY10
  - Staffing
  - Scientific programs: CDI, Expeditions, *Data-Intensive Computing, Cyber-Physical Systems, Network Science and Engineering*
  - Education
  - Process
- Enlisting Community Engagement
- New Initiatives (Summary)

NSF News

People

- OCI Director search ongoing. Dan Atkins leaves June 4.
- ENG AD search ongoing. Richard Buckius leaves in September. Please send names to Dr. Olsen (kolsen@nsf.gov).
- Tim Killeen, currently director of the National Center for Atmospheric Research (NCAR) will be new GEO AD starting July 1.

Planning: Two AD Retreats

- April
  - Focused on NSF organizational issues, e.g., interdisciplinary efforts like CDI, international, etc.
- June
  - Focus on Budget Planning for FY10
  - The Breakout Session today is part of this planning process.

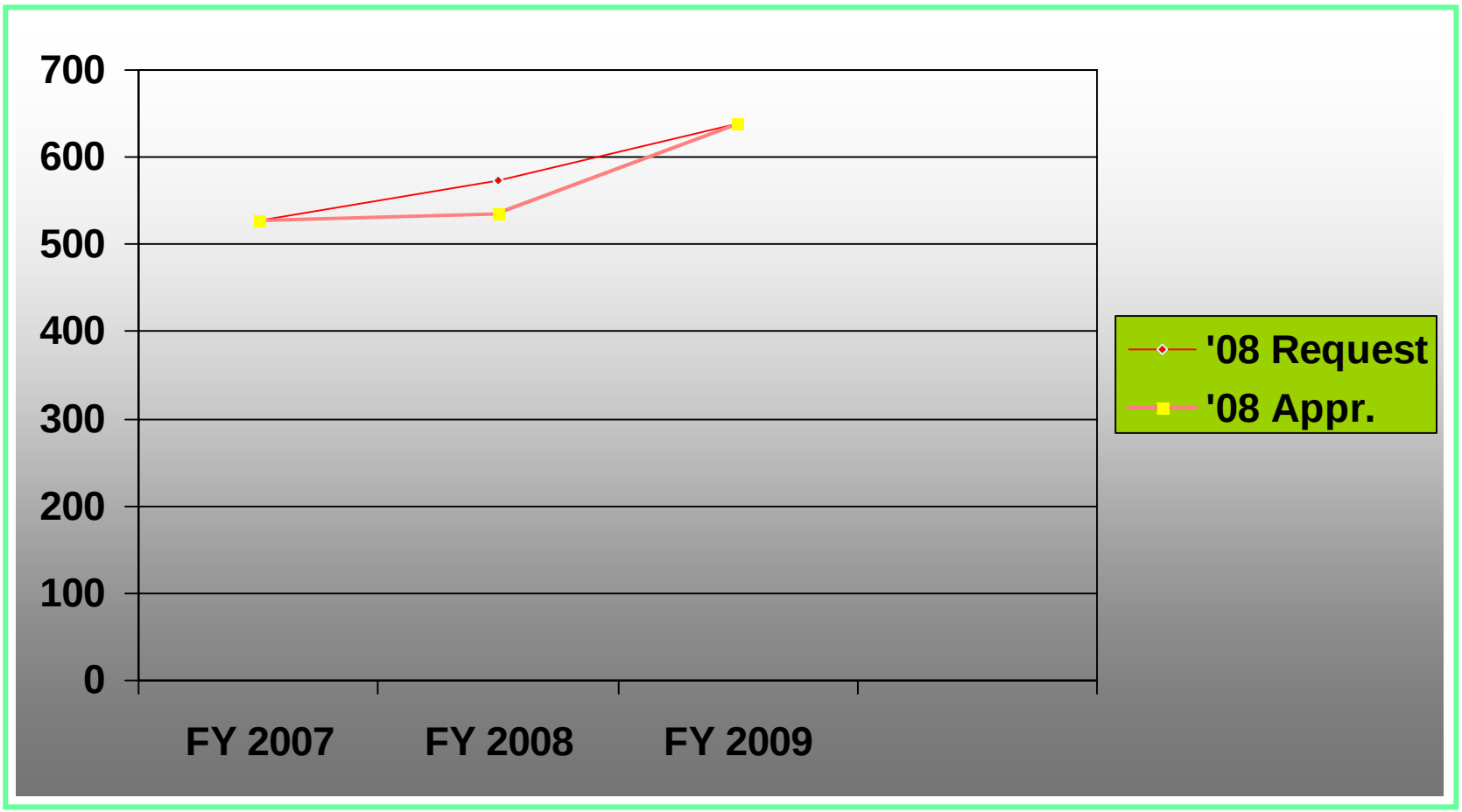
CISE Updates

FY08 and FY09 CISE Funding

- FY08 (FY began 10/1/07)
  - CISE request totaled $574 million, a 9 % increase over FY07
  - CISE appropriate is $535 million, only a 1.5% increase
  - Missed opportunities of $39 million

- FY09 (FY begins 10/1/08)
  - CISE Request totals $639 million
  - Reflects a $104 million increase, or 19.5 % over FY 2008 level.

CISE Funding



FY10 Budget

- AD Retreat in June will do Budget FY10 planning as usual.
- Your input from the Breakout Session will go towards our planning process.

Staffing

- CCF DD: Sampath Kannan joining July 1

- Always in search mode:
  - IIS DD, ~4 IIS PDs, ~3 CNS PDs, ~4 PDs in CCF
  - Beating the Bushes Committee helps
  - Effort
    - Ty contacted > 60 people for CNS
    - I contacted 36 for CCF DD search, 20 (so far) for IIS DD search

Scientific Programs: CDI

- Approximately 1900 Letters of intent, 1300 preliminary proposals, 200 final proposals, for ~30 awards
- ~650 Data to Knowledge, 500 Understanding Complexity, < 200 Virtual Organizations
- 80 PDs (31 from CISE) and 6 (4 from CISE) admin staff across the agency helped

Scientific Programs: Expeditions

	#	PI/co-PI/SP	Inst'ns	Ind/Gov't
LOI	122	1241	130	25
PP	75	1000	130	36
FP	20	360	53	12

27% success rate

- 3 awards to be announced by the end of August

- Topics
  - theory, cybersecurity, computing systems, internet/web/mobile computing, database/knowledge creation, cyber-physical systems

Scientific Programs: Data-Intensive Computing

- Cluster Exploratory (CluE): NSF partners with Google and IBM
  - Seed effort in NSF's interest in data-intensive computing, potentially beyond CISE
  - $5M, deadline: July 17, 2008, 10-15 awards
  - CISE is breaking new ground in many ways with this effort
  - Blueprint for other industry-academia-gov't partnerships
    - We welcome new models of partnership as well!

- Data-Intensive Computing
  - About a new paradigm in computing, not (just) about the cluster itself
  - Community interest: CCC-sponsored symposium held at Yahoo!

Scientific Programs: Cyber-Physical Systems

- Strong Momentum
  - Since 2000 EU-US engagement (Helsinki, Zurich, Brussels, Stockholm)
  - Since 2004 NITRD and NSF workshops on domains (medical, aviation, power grid, automotive) and CPS aspects (real-time, high-confidence, etc.)
  - May 2007 CSTB National Academies Study: *Software For Dependable Systems: Sufficient Evidence?*
  - August 2007 PCAST/NITRD Report: Priority #1: CPS
  - April 2008 (last week): CPS Week and CPS Summit, St. Louis
- NSF's interest
  - Seedling efforts in FY07 and FY08 within CISE/CSR.
  - FY09 solicitation in the works. Lead PD: Helen Gill. Enlisting Bruce Krogh's help.
  - CISE (cross-directorate) + ENG

Scientific Programs: Network Science and Engineering

Evolution of GENI to a broader research vision dubbed "NetSE"

Events since October's meeting

- Jeannette's presentation to the National Science Board in December
  - Challenge to the community: Is there a science to understanding the complexity of our networks so that we can engineer them to have predictable (adaptable) behavior?

- Creation of Network Science and Engineering Council in Jan/Feb
  - Broadens in membership from old GENI Science Council to include network scientists and theoreticians, network economists, social scientists
- CCC Charge to NetSE Council, led by Ellen Zegura, in April
  1. Develop a compelling research agenda
  2. Identify a set of experiments to carry out the agenda, e.g., to test out new theories/models of network complexity
  3. Work with the GENI Project Office to identify the suite of experimental infrastructure needed to carry out the experiments
- NetSE-organized four workshops to occur this spring and summer

- GPO-organized Engineering Meeting in March

Scientific Programs: Network Science and Engineering

- Separating out this agenda-setting process from the MREFC is a win for the community

  - Gives community time to breathe and be systematic in its thinking

  - NSF is changing MREFC rules and plans; we don't want to be entangled in a dynamic process.
    - Director's Principles: "No cost overruns and no schedule overruns."
    - More stringent management, more NSB involvement

Scientific Programs: Trustworthy Computing

- Deepening and broadening Cyber Trust
- Trustworthy = reliability, security, privacy, usability
- Three emphases for FY09
  - Foundations of trustworthy
    - Models, logics, algorithms, metrics
  - Privacy
  - Usability

Education

Challenge to Community: What is an effective way of teaching (learning) computational thinking to (by) K-12?

- Computational Thinking for Children
  - National Academies Computer Science and Telecommunications Board (CSTB): Workshops on CT for Everyone. *Collaborating with Board on Science Education.*
  - Internal CT working group (CISE+EHR+SBE)
  - Stay tuned for more by Harriet Taylor this afternoon.

- CS AP (AB) Exam
  - It's an opportunity for us!
  - Teleconference being scheduled for Ed Lazowska (CCC), Daniel Reed (CRA), Andy van Dam (CRA-E), Stu Feldman (ACM), Joe Traub (CSTB), Dick Karp (CISE AC co-chair), and Jeannette (CISE AD)
  - Likely ACM(-E) and/or CRA(-E) needs to take lead

Process Issues: Coordinated Solicitation

- Goal: To inform PI community of breadth of interests across CISE, to de-confuse the PI community, and to help them plan their proposal writing

- Part I: Core Programs
  - *Observe*: PIs do not know about opportunities in other core programs or other divisions.
  - *Observe*: Core program solicitations in all three divisions do not change from year to year.
  - *Plan*: All three divisions will release their core solicitations at the same time, with the same deadlines for the same size award. Descriptions of each core program will be short. Further details on website.

Process Issues: Coordinated Solicitation

- Part II: Cross-cutting Programs
  - *Observe*: PIs should be encouraged to work with people and on problems in areas different from their own; to work interdisciplinary and collaboratively.
  - *Observe*: Some programs cut across all three divisions; some topics require nimbleness and timeliness.
  - *Plan*: Each year, there will be one solicitation for N cross-cutting programs, e.g., Data-Intensive Computing, Trustworthy Computing, and Network Science and Engineering

Process: Re-Presenting CCF

- Old
  - Theoretical Foundations
  - Computing Processes and Artifacts
  - Emerging Models and Technologies
- New
  - Algorithmic Foundations
  - Software and Hardware Foundations
  - Communication and Information Foundations

- Notes
  - EMT is distributed across three programs. Idea: All three programs should be promoting emerging areas.
  - Foundations implies "theory" from algorithms, to semantics, to mathematical models. It pervades all of CCF (and in fact reaches beyond to CNS and IIS).

Process: Graphics

- *Observe:* Graphics traditionally in CCF, with strong bridges to computational geometry and numerical computing. As a field it has grown to have more and more in common with IIS, e.g., in computer vision, human-computer interaction, data visualization, and emerging areas like computational photography.

- *Plan:*
  - Computational geometry will remain in CCF (Algorithmic Foundations)
  - Graphics, more broadly speaking, will receive more emphasis in IIS
  - Given current staff, a team of PDs will manage Graphics
  - DCL (in the works) to explain the rationale and details to the community

- Please alert your graphics faculty to this change!

Enlisting Community Engagement

Back to Basics : Transformative Research

- NSF is about basic science and engineering.
  - Preserve CISE core.
- It's all about good ideas and good people.
- It's about "high risk" long term impact.
  - Impact may be far in the future.
  - Impact is long-lasting (that is real science).
  - Impact can create new economies and change societal behavior.
  - ⊘ Say "No" to incrementalism!
  - Promote new, emerging areas of computing.

NSF Needs Good People

- Quality of program directors
  - ⇒ Affects quality of reviewers chosen on panels and ad hoc
    - ⇒ Affects quality of reviews PIs receive
  - ⇒ Affects funding decisions
    - ⇒ Affects the nature and content of our research
  - ⇒ Affects the frontiers of our discipline!

- Collective effort
  - We are all part of the solution.
  - We are in this together!
    - CSTB, CRA, ACM, CCC, …
    - Government—Academia—Industry ecosystem

What You Can Do for NSF, for Computing

In increasing order of comfort:

- Service counts: Discuss at your institution how to include service as part of the evaluation, promotion, and tenure process.
- Names, names, names: Have your department head/dean/lab director send Dick Karp and me (1) a list of qualified reviewers, (2) a list of potential program directors, division directors, assistant directors.
- Support the field, support your colleagues: Our self-hypercriticalness hurts us when we compete at the foundation level (e.g., MRI, PECASE, S&TCs, ERCs, IGERT, CDI).
- Most importantly: Do great research!
  - Be creative, innovative, bold, visionary. As senior members of the community, set an example for and mentor the junior members.
  - Send us your good ideas!

Two Specific Requests of CISE AC

- NSB wants your input on (1) limits to proposal per institution by May 19 and (2) cost sharing by June 16.

- I need a CISE AC volunteer to serve on the NSF (foundation-wide) Environment Research and Education (ERE) Advisory Committee.

Engaging the AC: Reports at 3:00 Today

- Beating the Bushes Subcommittee
  - Mission: To help name and recruit potential PDs, DDs, and ADs
  - Dick Karp, Martha Pollack, Marc Snir
- Education Subcommittee
  - Goal: To help advise CISE on computing education programs and more broadly engage the community on issues such as my CT K-12 Question&Challenge
  - *Harriet Taylor*, Brian Blake, Alan Kay, Annie Anton
- Broadening Participation Subcommittee
  - Goal: To help CISE development its own BP plan and more broadly to advise CISE on how to effectively invest in BP.
  - *Jan Cuny*, Richard Ladner, Jorge Diaz-Herrera, Melissa O'Neill
- Industry Subcommittee
  - Goal: To help advise CISE on novel models of engagement and/or programs for academic-industry-government partnerships
  - *Frederica Darema,* Andrew Chien, Haym Hirsh, Monica Lam, Rico Malvar, Dan Weld

Engaging the AC: Breakout Groups

- Human+Computer Partnerships
  - *Don Norman* and Amy Baylor
- Cyber-Physical Systems
  - *Robin Murphy* and Helen Gill (and Bruce Krogh)
- Rethinking Software
  - *Greg Morrisett* and Sol Greenspan (and Jim Larus)
- IT + Sustainability
  - *Vint Cert* and Jeannette Wing
- Stewardship of Community
  - *Martha Pollack* and Deb Crawford

Stewardship of Community

- Issues
  - Service to community: Quality of PDs, DDs, and AD
    - Not just NSF
  - Breaking Cycle of Incrementalism
  - Mentoring junior faculty
  - Grooming future leaders of our field
  - Consensus-building in community
    - Hypercriticality
    - Organizing itself
    - Being more politically savvy
  - What can NSF do? What kind of funding modalities could change behavior?

- Modes
  - Convene a small group of people from research community
    - Step One: CISE AC
  - Convene a meeting of all CS dept heads and deans, separate from Snowbird
  - Tack onto Snowbird 2010 (so far away!)
  - CCC
  - …
  - Do nothing

Thanks to CISE!

- CISE works as a team.

- Special recognition to the program directors and administrative staff.

Thank You!

CISE New Initiatives (Summary)

FY08/FY09

- CISE Research
  - Cyber-Physical Systems (with ENG)
  - Data-Intensive Computing (CluE)
  - Network Science and Engineering
  - Rethinking Software
- CISE Education
  - Computational Thinking for Everyone

- NSF-wide (FY09 Budget Request)
  - Science and Engineering Beyond Moore's Law: CISE, ENG, MPS
  - Adaptive Systems Technology: BIO, CISE, ENG, SBE