Computing Research Association
Conference at Snowbird 2000

Slides
on the topic of

"Some Challenges to Computer Science/Engineering in the 21st Century"

presented by

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http://www.cra.org/Activities/snowbird/00/dinner.html

Some Challenges for Computer Science/Engineering in the 21st Century

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An Outline ---

1. About the National Academies
2. Be suspicious about any talk with this title!
3. This will focus on non-technical challenges
   the issues are *not* orthogonal

4. The challenge of being so *damned* relevant
5. The challenge of ethics when you don't know what
   you're doing -- and *can't*!
6. The challenge of of growing responsibility
7. The challenge of
   a mid life crisis (where are the next great ideas?)
   being both a discipline and an infrastructure
   identity (who/what *are* we?)

About the Academies

- Private corporation, but chartered (as the NAS) by Congress in 1863

- Originally intended as a purely honorific organization

- Congress inserted language requiring the Academy to advise the federal government on issues of science and technology.

- Thus, the Academies are dual-hatted
      - honorific
      - fiercely independent, unbiased, authoritative
            advisors to government

"telling truth to power"

About the Academies (2)

- NAS => {NAS, NAE, IOM, NRC}
  my job is Pres of the NAE and vice-chair of the NRC
- Membership ~2000 NAS, ~2000 NAE, ~1200 IOM
- Everything is a special case, but in general ...
  - Studies are done by 10-20 pro bono experts -- the best there is!
  - Reports are "PhD theses" -- 300pp, fact based, …
  - We produce such a report every day!
  - At any time there are 6-10,000 "volunteers"

Be Suspicious!

- Our record of predicting the implications of IT <u>stink</u> (The common thread of mispredictions, I think, is unstated assumptions -- and I am no better than others at teasing out my assumptions)

- I will, therefore offer no answers and only ask questions!

Challenge:
Being so *Damned* Relevant!

- There is a LOT of money, power, media attention, …, focused on IT

- Universities and CS/CE Depts are obvious knowledge creation engines, therefore …

- Just some examples of the challenges created:
  - faculty (and student) conflicts of interest & commitment
  - degraded quality of industry/academe interactions
  - little/no PostDoc pool
  - non-traditional pressures on funders
  - ...

Challenge:
Ethics when you don't know what you're doing ***and can't***!

- the correctness problem
  - as usually formulated
  - for computer security (eg, for cryptographic protocols)
- emergent properties (the NRL study of security holes)

- The usual engineering solution, "add a safety margin", is just the wrong thing to do …

  What's ethical if you ***know*** the system will have properties that you can't predict?

Challenge:
Growing Responsibility

- For broad, liberal education?

- For non-science academic applications?

- For a long list of deep social issues and structures?
    - the legal system (eg, jurisdiction)
    - governance (sovereignty, participatory democracy, …)
    - national defense / law enforcement
    - institutions (eg, universities)

Challenge:

- ## CS/CE's mid life crisis
  - have we solved all the hard problems?
- ## Being a discipline and an infrastructure
  - the NSF/CISE problem
  - CS/CE depts and the university
- ## Identity
  - are we a science or engineering or <?>

A Summary of Sorts

- The challenge is *being different*, consciously and constructively
  - the easy models will mislead!

- The challenge is for *you* to do something about it!