Measuring the health of the computing field:
Challenges facing the CRA community

Eric Grimson
EECS, MIT
Chair, CRA Board
How do we measure the health of the computing research community?

- Funding levels and trends
- Production of students
  - Numbers of students
  - Where they go and the demand level
- Perception of the field and its impact
- Influence on other disciplines
Funding levels and trends

- FY11 budget process in Congress
  - COMPETES Act (2007) in process of renewal – double NSF budget over 7 years
  - DARPA budget expected to increase over last FY
  - DARPA moving to reinvest in university funding
  - NIH computation related funding rising

- Challenges remain – GAC promoting agenda
  - (Snowbird session on impact in DC)
Government IT R&D funding

Refactoring of funding by NIH

Source: Peter Harsha, CRA
Selected agencies

Source: Peter Harsha, CRA
Production of students

• Doctoral production
• The earlier pipeline
  – New bachelors students
• The even earlier pipeline?
Doctoral production

Source: Susanne Hambrusch, Purdue
Where are our graduates going?
Bachelors production

Source: Susanne Hambrusch, Purdue
New Bachelors students

- Source – Taulbee survey
- CS has been flat since 2005, with a very slight upturn
- CE essentially flat since 2002
Improving the diversity of the field

• Trends in degree recipients
• Trends in faculty positions
Diversity

Percent of Women IT Degree Recipients
Diversity in faculty

Percent of Women Faculty

- New Ten Trk Faculty
- Assistant Professors
- Associate Professors
- Full Professors
Why are we struggling to attract students?

- US Dept. of Labor statistics show that CS/CE has large demand, high initial wages
  - 2 of top 6 occupations that require a college degree with largest projected growth in jobs are CS/CE related
- So why are we flat in terms of the pipeline?
  - We are working on getting C into CSTEM in schools, but progress is slow
    - Changing the CS AP exam, getting CS included in local curricula
    - (Snowbird session on CS/10K)
  - We need to think about how students see our curriculum
    - (Snowbird session on CRA-E)
Perception of the field

• We are losing the “design” battle to other fields, especially Mechanical Engineering
  – Are we communicating well to students the exciting opportunities in the field?
• Current students want to make an impact
  – Is our curriculum set up to encourage students with broader interests?
  – Do we do a good job of selling CS/CE for sustainability, environmental issues, health care, energy, social well-being?
Perception of the field

• The Obama administration is stressing four broad priorities
  – economic prosperity
  – energy, environment, climate change
  – healthcare: biomed and IT
  – national security

• We should be significant players in all of these
  – Are we?

• The NRC rankings process may not help our image?
Are we encouraging impact?

• Are we becoming a deadline-driven field?
  – Research driven by the next conference deadline, rather than taking the time to tackle large scale issues?

• Are we hiring and promoting based on impact or volume?
  – (Snowbird discussion on publications)
Impact: Influence on other fields

• Growing opportunities for computation in:
  – Life sciences
  – Medicine
  – Finance
  – Energy
  – Transportation

• Challenge is to articulate importance of IT role in these areas
Influence on other fields

• Computational-X
  – We have an opportunity to relate to a wide range of other disciplines – in curricula, in research, in applications

• “Computational thinking”
  – Every well educated person should understand computational thinking