Summary

CRA Computing Leadership Summit
February 28, 2005
Washington, DC

This summary has been extracted and organized from the Leadership Summit presentations and discussions. It does not represent an official set of conclusions, but is intended to capture the spirit of the meeting and serve as a starting point for further actions.

Problems Facing Computing

All is not well within the computing community. Symptoms of the problems include:

1. The US is gradually losing competitiveness in the global economy.
2. Good ideas are not being investigated because of funding constraints.
3. Bureau of Labor Statistics project that the 10-year demand for IT workers will far exceed supply.
4. Corporations cannot hire the desired number of employees from among US students.
5. Large retirement bubbles are lurking, particularly in federal agencies.
6. Opinions expressed about computing, careers in computing, and government research funding for computing are often negative; for instance:
    i. IT invented great stuff and now it's all development and commercialization. Just filling in the details.
    ii. Sure IT has contributed to productivity, but its contributions are now institutionalized.
    iii. Since IT is pervasive, everyone deals with it and has an opinion that is often not favorable.
    iv. Companies make money on IT so they should fund research. No one makes money on, e.g., astronomy, so the government funds astronomical research.
    v. CS is programming. CS jobs are boring. CS jobs are going overseas. CS is nerds playing games.
    vi. CS is hard work and is not for the weak or timid.
    vii. Federal mission agencies use fruits of computing research but do not wish to fund it, even when directly related to their missions.

Root Causes of the Problems

1. Computing has been so successful that it is difficult for many to believe in substantial additional progress.
2. Publicity about offshoring gives the false impression that a career in computing is a dead end.
3. The public does not have a good understanding of the value, importance, and content of computing.

4. Prospective students do not view computing careers as sufficiently exciting, rewarding, or secure when compared to alternative careers.
5. Our elected and appointed leaders in the Nation's Capital do not appreciate the importance of federal investment in computing research to our Nation's economic competitiveness, to our national security, and to our citizens' health and well-being.
6. Disciplines other than computing do not always appreciate the importance of computing as a key element to their own success.

Actions

To change the current situation, we need to develop and deliver messages and programs that address the root causes of the problems:

1. Change the general perception of computing.
2. Attract students to computing.
3. Focus legislators on the impact of computing on the economy, health, and security so that research funding is increased.
4. Convince other disciplines of the importance of their supporting computing research in order to further research in their own discipline.

In the next four sections – one for each action – message elements and ways to deliver the message are listed. The messages and actions will be refined as we begin to operationalize.

1. Change the general perception of computing

Message elements

1. Develop a campaign that emphasizes that there is still much to create in the world of computing—that if you can dream it you can make it happen. Computing is a discipline where you can create whatever you dream because you create a virtual world—computing is one of the purest ways for the intellect to "create:"
    a. Tell stories about how dreams have been brought to life, in engineering, in business. YOU can have an impact.
    b. Possible Tag line – "What's *your* dream?"
    c. Develop human impact snippets:
        i. Robots that do surgery (e.g., hip replacement; prostate).
        ii. Computational model that calculated, within an hour of an earthquake, that a tsunami would occur in Indian Ocean.
        iii. Computer helps a person hear for the first time.
        iv. A soldier deployed overseas talks to family.
        v. Murder rate in New Orleans decreased by 50% through the use of IT (Bill Gates, 2/27/05).

Ways to deliver the message (note – some of these apply to messages for other actions as well)

1. Engage a PR firm to help craft and deliver the message:

a. Raise money to involve a PR firm –
    i. From societies and companies
2. Devise common messages across industry and academia and societies – common tag line, iconography.
    a. Use click-throughs on web sites
3. Some specifics
    a. Talk to writers of "Numbers" (new TV show) to suggest story lines.
    b. Connect with Hollywood to encourage positive portrayals.
    c. Connect with Science and Technology Writers Subcommittee of the National Press Club.
    d. Develop ways to connect reporters to experts.
4. Op-Ed letters, press releases.
5. Work with corporate PR offices to enhance the image of computing.
6. Actions to avoid:
    a. Looking "elite" and coming across as "We elites are being hurt"—focus on meeting the needs of broader populations.
    b. "IT is more important or better or more necessary than other disciplines."
    c. Failing to understand our audience.
    d. Invoking the "chicken little" argument.

2. Attract students to computing, including more of the best and brightest students, and at all levels – K-12, as undergrads, and as graduate students.

Message elements

1. Develop a picture of the range of jobs available for people with computing degrees, and the anticipated numbers of such jobs; generate a scorecard for parents, teachers, and students.
2. Show the true nature of computing career—exciting, working in teams, helping others through IT systems; not just the classic stereotypes.
3. Redo the entry level courses and non-major courses to emphasize the intersection of computing with other disciplines; demonstrate the connection between computing and students' interests in IT products and facilities; emphasize the connectedness, excitement, and creativity of computing.
4. Introduce dynamic computer content, connected to students' interests, into K-12.
5. Develop this content in collaboration with ACM and IEEE-CS.
6. At the college level—look at computing minors for other disciplines, alternatives to traditional BSCS in computing such as digital media; degrees in computing + X.
7. At the high-school level—create a one-semester pilot course, or a module to attract students into computing via their IT-related interests.

Ways to deliver the message

1. IEEE-CS, ACM, and university/college education activities.
2. Highlighting existing curricular elements that convey the above message.
3. ACM's Computer Science Teachers Association (CSTA).
4. To K-12 via extra curricular activities such as projects, contests; involve

design, not necessarily programming.

5. Companies telling students about opportunities and needed skills.

3. Focus legislators on the impact of computing on the economy, security and health

Message elements

1. Research leads to national competitive advantage (wealth):
   a. Applies to and enables research in all fields of science & engineering.
   b. WRT Computer Science, we observe a few special things:
      i. Multifactor productivity—efficiency, including in government.
      ii. Big, successful, and important industry today as shown, for instance, by CSTB's tire-track diagrams.
      iii. Has made countless lives better (with examples).
      iv. Essential for progress in other fields of science and engineering.
2. Increasing competition abounds; for example:
   a. Demonstrated job market growth in India and China.
   b. Chinese C.S. Ph.D. program surpassing US.
   c. Growth of industry in various countries.
3. There is great research to be done (that isn't being done):
   a. Direct demonstrations.
   b. Places where breakthroughs are needed (and plausible).
   c. Data from (unfunded) solicitations indicates more work to be done.
   d. Shown indirectly:
      i. Research as a function of (Rate of Change) * (Size of Field) in comparison to other fields.
      ii. Projects of Demand vs. Supply.
      iii. Comparison with other countries.
      iv. Comparisons with other fields.
4. There is absorptive capacity:
   a. That is, the nation will be able to use and benefit from the research results.
5. Importance of maintaining population/expertise in field:
   a. Undergraduate population declining.
   b. Top potential graduate students may (soon) not be applying.
   c. Quality of Ph.D. programs may start to decline.
6. National security arguments:
   a. Make sure there is a pool of trustworthy capacity.
   b. Cybersecurity research to keep the computing infrastructure and physical infrastructure (controlled by computers) secure.
   c. Basic computing research supports the mission of the intelligence agencies: we do need to be able to connect the dots and find the needles in the haystacks; hopefully this can keep us out of war.
   d. If we do have a war, technology (including robots) may make the war shorter with fewer casualties.
7. Health care arguments:
   a. Medical record efficiency, eldercare, imaging, personalized medicine, rational drug design, etc. Pervasiveness of data requires security. For

personalized medicine, personal DNA information will be needed, but safeguards must be in place.

8. Emotional arguments:
   a. future of the country?
   b. future technology vision
9. There is value in having multiple funding agencies, multiple funding models.
   a. Right now this is broken because of changes at DARPA; either fix DARPA or increase CISE funding.
   b. Get the story straight re cyberinfrastructure and why we need basic research at NSF and DARPA.
10. Work also at the state level. Develop material and find best practices information on what the most proactive states are doing to spur economic development via investments in IT research. Examples include Indiana 21st century, CALIT^2, CA stem call initiative.

Ways to deliver the message

1. Develop a coalition of societies and companies to be **THE** source of computing research information to the government and to coalitions such as ASTRA, Council on Competitiveness, National Association of Manufacturers, TechNet, Task Force on the Future of American Innovation, as well as to our member societies.
2. Hire a lobbying firm to craft and deliver the message:
   a. Raise money to pay for this from societies and companies.
3. Develop "canned" presentations and "elevator speeches"; make available to all, deliver to Senators and Representatives and the administration.
4. Redo "Computing Research: Driving IT and the Information Industry Forward," CRA report (by Ed Lazowska) with geographically diverse and important industries for future economic development.
5. Encourage academics to become engaged; provide resources such as draft letters, presentations, and elevator speeches:
   a. Use Snowbird as a regular ongoing way to help with this.
   b. CRA reach out to other societies, such as ECEDHA and ASIST.
6. Engage diverse industry leaders to testify in Congress and actively engage their Representatives and Senators about the importance of IT progress to the future of their industries.
   a. Include industries with big impact (Pharmaceutical, Entertainment, Computing).
   b. Get top 10 CEOs + top 10 university presidents to meet with legislative leaders.
   c. Open Letter of 25 CEOs sent to Congress and the Administration; place in high-visibility publications.
7. Engage trade associations (carefully).
8. Drive for a hearing in the House and/or Senate.
9. Work through National Governors' Association and CRA members to communicate at the state level.

4. Reach out to other disciplines about the importance of supporting computing research to further research in their own disciplines.

Message elements

1. Computing is the third way in all of science and engineering, so is a necessary pillar of future progress.
2. Develop examples of computing research that substantively impacted other disciplines and enabled advancements elsewhere.
3. What has been developed is not sufficient for their needs. Further research in both software and hardware is needed to further the application of computing in a variety of fields.

Ways to deliver the message

1. Organize workshops with agencies other than NSF and DARPA, as is being organized at NIH by Eric Jakobsson and Chris Johnson.
2. Reach individual agency leaders to help make case for IT research funding at NSF and other agencies.
3. Focus on CS+X synergies and consider new, or strengthened, NITRD management at NSF, NIH, and other federal agencies.

CRA Computing Leadership Summit
Organized by the Computing Research Association

Melrose Hotel, Washington, DC—February 28, 2005

Attendees

AAAI
Ron Brachman, President
Tim Finin, CRA Board Representative

ACM
David Patterson, President
John White, Executive Director
Barbara Simons, Past President
Cameron Wilson, Director, Public Policy Office
Eugene Spafford, CRA Board Representative
Jennifer Rexford, CRA Board Representative

CACS/AIC (Canadian Assoc. of Computer Science/ Assoc. d'informatique canadienne)
Gord McCalla, President
Frank Tompa, CRA Board Representative

IEEE-Computer Society
Carl Chang, 2004 President
Anne Marie Kelly, Associate Executive Director
Oscar Garcia, CRA Board Representative

SIAM
Martin Golubitsky, President
Jim Crowley, Executive Director
Mel Ciment, SIAM Government Affairs
Joel M. Widder, Lewis-Burke Associates LLC
Bobby Schnabel, CRA Board Representative

USENIX
Rob Kolstad, SAGE Executive Director

CSTB (Computer Science and Telecommunications Board, NRC)
Jeannette Wing, Co-Chair
Charles Brownstein, Executive Director

CRA
Jim Foley, Chair
Dan Reed, Chair-Elect
Jan Cuny, Vice Chair
Andy Bernat, Executive Director
Peter Harsha, Government Affairs Director
John King, Chair, Gov. Affairs Committee
Jeff Vitter, Co-Chair, Gov. Affairs Committee

PITAC
Ed Lazowska, PITAC Co-Chair (and Co-Chair, CRA Gov't Affrs. Comm.)

ECEDHA (Electrical and Computer Engineering Department Heads Association)
Wayne Bennett **(**also CRA Gov't Affrs. Comm.)

Industry Representatives
Alan Eustace, **Google**
Wayne Johnson, **HP**
Al Spector, **IBM**
T.V. Lakshman, **Lucent Bell Labs**
Rick Rashid, **Microsoft**
Steve Heller, **SUN**
Rick White, **TECHnet**

Other Organizations
Nick Belkin, **ASIST (**American Society for Information Science and Technology)
Sue Fratkin, **CASC** (Coalition for Advanced Scientific Computation)
Craig Stewart, **CASC**
Robert Kahn, **CNRI** (Corporation for National Research Initiatives)
William Wulf, **National Academy of Engineering**
Lucy Sanders, **NCWIT (**National Center for Women and Information Technology)
Peter Freeman, **NSF/CISE** (National Science Foundation, Computer & Information Science & Engineering Dir.)