The Computing Community Consortium

Dr. Erwin Gianchandani
Director, Computing Community Consortium
Computing Research Association

UC-Davis Dept. of Computer Science
June 3, 2011

Overview

- The Computing Research Association
- What is the CCC?
- We need you!

The Computing Research Association

Over 220 department/lab members

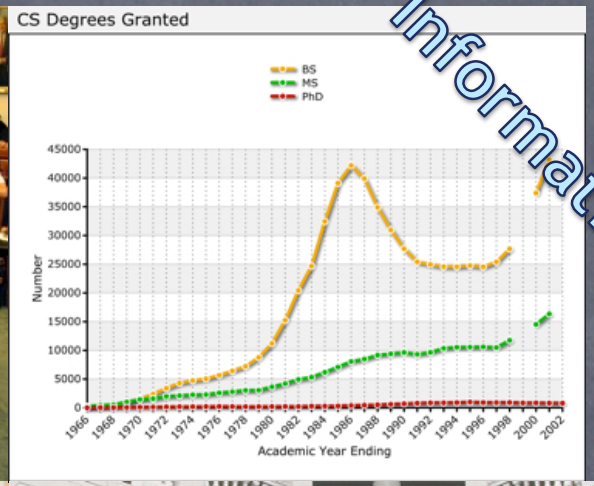
Arizona State University - CSE
Auburn University - CSSE
Ball State University - CS
Boston College - CS
Boston University - CS
Bowdoin College - CS
Bowling Green State University - CS
Bradley University - CS
Brandeis University - CS
Brigham Young University - CS
Brown University - CS
Bryn Mawr College - MCS
Bucknell University - CS
California Institute of Technology - CS
California Polytechnic State University - CS
California State University, Chico - CS
Carnegie Mellon University - CS
Case Western Reserve University - EECS
City University of New York, Graduate Center - CS
Clemson University - CS
Colgate University - CS
College of William & Mary - CS
Colorado School of Mines - MCS
Colorado State University - CS
Columbia University - CS
Cornell University - CS
Cornell University - ECE
Dalhousie University - CS
Dartmouth College - CS
DePaul University - CS
Drexel University - CS
Drexel University - IST
Duke University - CS
Emory University - MCS
Florida Atlantic University - CSE
Florida Institute of Technology - CS
Florida International University - CS
Florida State University - CS
Florida State University - IS
George Mason University - CS
George Washington University - CS
Georgia Institute of Technology - CSE
Georgia Southern University - IT
Georgia State University - CIS
Georgia State University - CS
Grinnell College - MCS
Harvard University - CS
Harvey Mudd College - CS
Hofstra Universyt - CS
Illinois Institute of Technology - CS
Illinois State University - ACS
Indiana University - CS
Indiana University - I
Iowa State University - CS
Iowa State University - ECE
Johns Hopkins University - CS
Johns Hopkins University - SI
Juniata College - IT & CS
Kansas State University - CIS
Kent State University - CS
Lafayette College - CS
Lehigh University - CSE
Long Island University - ICS
Louisiana State University - CS
Loyola University, Chicago - CS
Massachusetts Institute of Technology - EECS
Miami University - CS
McMaster University - CE&S
Michigan State University - CSE
Michigan Technological University - CS
Mississippi State University - CS
Montana State University - CS
Montclair State University - CS
National University of Singapore - CS/IS
Naval Postgraduate School - CS
New Jersey Institute of Technology - CCS
New Mexico State University - CS
New York University - CS
North Carolina State University - CS
Northeastern University - CIS
Northwestern University - ECE
Nova Southeasern University - CS
Oakland University - CSE
Ohio State University - CSE
Ohio University - EECS
Oklahoma State University - CS
Old Dominion University - CS
Oregon Health & Science University - CSE
Oregon State University - EECS
Pace University - CSIS
Pennsylvania State University - CSE
Pennsylvania State University - IST
Polytechnic University - CIS
Pomona College - MCS
Portland State University - CS
Princeton University - CS
Purdue University - CS
Purdue University - ECE
Rensselaer Polytechnic Institute - CS
Rice University - CS
Rochester Institute of Technology - CS
Roosevelt University - CS&T
Rutgers University, Busch Campus - CS
Saint Louis University - MCS
Santa Clara University - CE
Simon Fraser University - CS
Singapore Management University - IS
Southern Illinois University, Carbondale - CS
Southern Methodist University - CSE
Southern Polytechnic State University - CSE
Stanford University - CS
State University of New York, Albany - CS
State University of New York, Binghamton - CS
State University of New York, Stony Brook - CS
Stevens Institute of Technology - CS
Swarthmore College - CS
Syracuse University - IS
Temple University - CIS
Texas A&M University - CS
Texas State University - CS
Toyota Technological Institute at Chicago - CS
Tufts University - CS
Tulane University - EECS
Union College - CS
University at Buffalo - CSE
University at Buffalo - IS
University of Alabama, Birmingham - CIS
University of Alabama, Tuscaloosa - CS
University of Alberta - CS
University of Arizona - CS
University of Arkansas - CSCE
University of Arkansas at Little Rock - I
University of Calgary - CS
University of California, Berkeley - EECS
University of California, Berkeley - IMS
University of California, Davis - CS
University of California, Irvine - ICS
University of California, Los Angeles - CS
University of California, Riverside - CSE
University of California, San Diego - CSE
University of California, Santa Barbara - CS
University of California, Santa Cruz - CE
University of California, Santa Cruz - CS
University of Central Florida - CS
University of Chicago - CS
University of Cincinnati - ECECS
University of Colorado, Boulder - CS
University of Delaware - CIS
University of Denver - CS
University of Florida - CISE
University of Georgia - CS
University of Hawaii - ICS
University of Houston - CS
University of Houston - ECE
University of Idaho - CS
University of Illinois, Chicago - CS
University of Illinois, Urbana Champaign - CS
University of Illinois, Urbana Champaign - ECE
University of Iowa - CS
University of Kansas - EECS
University of Kentucky - CS
University of Louisiana at Lafayette - CACS
University of Louisville - CECS
University of Maine - CS
University of Maryland - CS
University of Maryland, Baltimore Co - CSEE
University of Maryland, Baltimore Co - IS
University of Massachusetts, Amherst - CS
University of Massachusetts, Boston - CS
University of Michigan - EECS
University of Michigan - I
University of Michigan, Dearborn - CIS
University of Minnesota - CSE
University of Minnesota, Duluth - CS
University of Mississippi - CIS
University of Missouri, Columbia - CS
University of Missouri, Rolla - CS
University of Montana - CS
University of Montreal - CS
University of Nebraska at Omaha - CS/IST
University of Nebraska, Lincoln - CSE
University of Nevada, Las Vegas - CS
University of Nevada, Reno - CSE
University of New Brunswick - CS
University of New Hampshire - CS
University of New Mexico - CS
University of New Mexico - ECE
University of North Carolina at Chapel Hill - CS
University of North Carolina at Chapel Hill - SILS
University of North Carolina, Charlotte - IT
University of North Dakota - CS
University of North Texas - CS
University of Notre Dame - CSE
University of Oklahoma - CS
University of Oregon - CIS
University of Pennsylvania - CIS
University of Pittsburgh - CS
University of Pittsburgh - IS
University of Puget Sound - MCS
University of Rochester - CS
University of South Alabama - CIS
University of South Carolina - CSE
University of South Florida - CSE
University of Southern California - CS
University of Southern California - EES
University of Tennessee, Knoxville - CS
University of Texas, Arlington - CSE
University of Texas, Austin - CS
University of Texas, Dallas - CS
University of Texas, El Paso - CS
University of Toronto - CS
University of Tulsa - MCS
University of Utah - CS
University of Virginia - CS
University of Washington - CSE
University of Washington - I
University of Washington, Bothell - CS
University of Washington, Tacoma - CSS
University of Waterloo - CS
University of Wisconsin, Madison - CS
University of Wisconsin, Milwaukee - EECS
University of Wyoming - CS
Utah State University - CS
Vanderbilt University - EECS
Virginia Commonwealth University - CS
Virginia Tech - CS
Wake Forest University - CS
Washington State University - EECS
Washington University in St. Louis - CS
Wayne State University - CS
West Virginia University - CSEE
Western Michigan University - CS
Williams College - CS
Worcester Polytechnic Institute - CS
Wright State University - CSE
Yale University - CS
York University - CS

Sun Microsystems (Sponsoring Member)
Microsoft Corporation (Sustaining Member)
IBM Research (Supporting Member)

Accenture Technology Labs
Argonne National Laboratory
Avaya
CA Labs
Computer Science Research Institute, Sandia National Labs
Fraunhofer Center for Experimental Software Engineering
Fujitsu Laboratories of America
Google
Hewlett-Packard Company
IDA Center for Computing Sciences
Intel Corporation
Lawrence Berkeley National Laboratory
Los Alamos National Laboratory
Lucent Technologies, Bell Labs
McAfee Research
Mitsubishi Electric Research Labs
National Center for Atmospheric Research
NCSA
NEC Laboratories America
NTT DoCoMo USA Labs
Pacific Northwest National Laboratory
Panasonic Information & Networking Technologies Lab
Ricoh Innovations
San Diego Supercomputer Center
SAP Labs
SRI International
Telcordia Technologies

COMPUTING RESEARCH ASSOCIATION
CRA

Core activities



Mission + activities

- Strengthen research and education in the computing fields
  - *Government Affairs* working to influence **policy** that impacts computing research
  - *CRA-W CDC* encouraging the development of **human resources**
  - CCC contributing to the cohesiveness of the professional **community**
- Collect and disseminate **information** about the importance and state of computing research

The Computing Community Consortium

Concerns in the mid-2000s...

- NSF leaders and computing research leaders had similar deep concerns about computing:
  - Failure to articulate and coalesce around exciting research visions in computer science that could galvanize the public, policymakers, researchers, and students
  - Need to groom the future leadership of the field
  - Decrease in student interest

...Led to the need for a "CCC"...

- Increased focus by NSF leaders and computing research leaders in academia & industry
- A Computing Community Consortium solicitation & proposal
  - "[NSF] will support the CCC as a community proxy responsible for facilitating the conceptualization and design of promising infrastructure-intensive projects..."
  - "The purpose of the CCC is to provide a voice for the national computing research community. The CCC will facilitate the development of a bold, multi-themed vision for computing research and education... [communicating] that vision to ... major stakeholders."

...And NSF asked CRA to create it

- To catalyze the computing research community to consider such questions
  - To envision long-range, more audacious research challenges
  - To build momentum around such visions
  - To state them in compelling ways
  - To move them towards funded initiatives
  - To ensure "science oversight" of large-scale initiatives
- A "cooperative agreement" with NSF
  - Close coordination

The CCC -- a broad-based Council

- Leadership:
  - Ed Lazowska, Chair
  - Susan Graham, Vice-Chair
  - Erwin Gianchandani, Director
  - Andrew Bernat, CRA Executive Director
- Terms ending 2014
  - Deborah Crawford
  - Gregory Hager
  - John Mitchell
  - Bob Sproull
  - Josep Torrellas
- Terms ending 2013
  - Randy Bryant
  - Lance Fortnow
  - Eric Horvitz
  - Hank Korth
  - Beth Mynatt
  - Fred Schneider
  - Margo Seltzer
- Terms ending 2012
  - Stephanie Forrest
  - Chris Johnson
  - Anita Jones
  - Frans Kaashoek
  - Ran Libeskind-Hadas
  - Robin Murphy
- Rotated off
  - Greg Andrews, 2009
  - Bill Feiereisen, 2011
  - Dave Kaeli, 2011
  - Dick Karp, 2010
  - John King, 2011
  - Peter Lee, 2009
  - Andrew McCallum, 2010
  - Karen Sutherland, 2009
  - Dave Waltz, 2010

Meets three times a year, including once in DC

Funded at $2M/year for three years

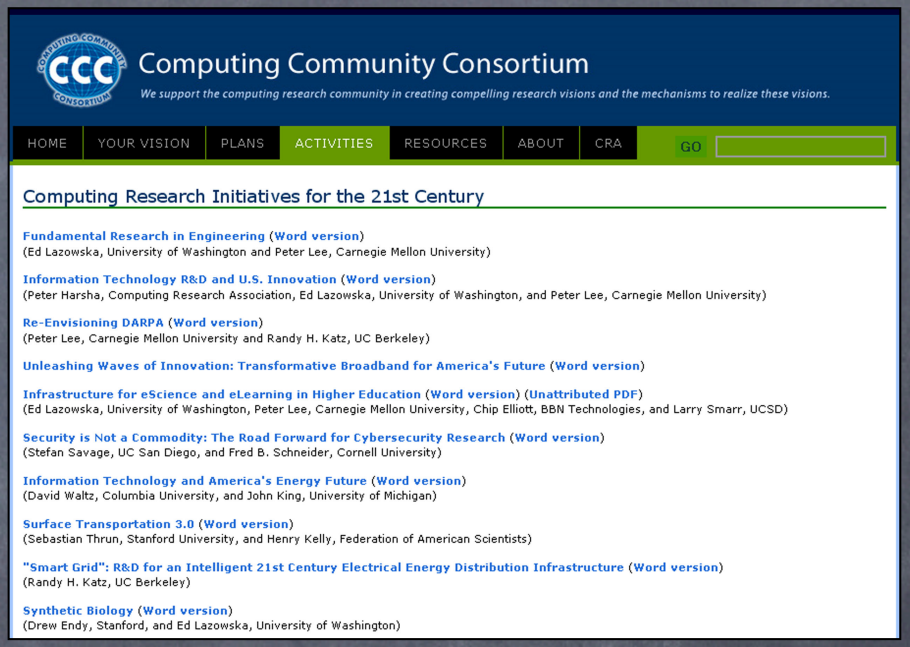
Communicating about computing...

- Presentations
- Articles
- CCC Blog
- Computing Research "Highlight of the Week"

...to the community, to the public, etc.

Outreach to Federal agencies

- "Transition Team" white papers

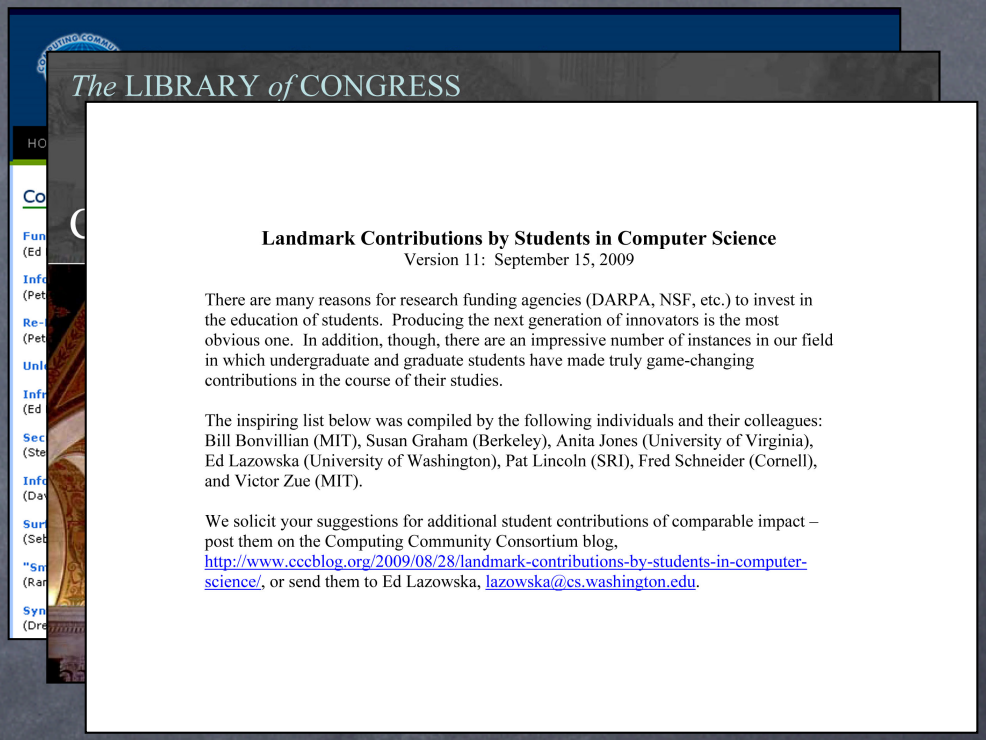


"Transition Team" white papers

- Sensed and seized an opportunity to influence Federal science policy through the Presidential Transition Team
  - 19 papers produced in late 2008 & early 2009
  - 30 separate authors
  - Many highly influential:
    - Re-envisioning DARPA -- Peter Lee, Randy Katz
    - Infrastructure for eScience & eLearning/Unleashing waves of innovation -- Ed Lazowska, Peter Lee, Chip Elliott, Larry Smarr
    - Security is not a commodity -- Stefan Savage, Fred Schneider
    - Synthetic biology -- Drew Endy, Ed Lazowska
    - Big-data computing -- Randy Bryant, Randy Katz, Ed Lazowska
    - The ocean observatories initiative -- John Delaney, John Orcutt, Robert Weller
    - Cyber-Physical Systems -- Janos Sztipanovits, Jack Stankovic

Outreach to Federal agencies

- "Transition Team" white papers
- Library of Congress Symposium
- "Landmark Contributions by Students in Computer Science"



Leadership development

- Computing Innovation Fellows (CIFellows)

Computing Innovation Fellows Project

Home CRA CCC CISE

The 2009 Computing Innovation Fellows have been selected!

View the press release with the names of the 2009 Fellows and their Mentors.

Congratulations to everyone who was selected for a CIFellow award!
Thank you for your interest in CIFellows. The response has been tremendous!
For up-to- the-minute news on the progress of the selection process, check out the forum.

In the light of the response that the CIFellows has received, we have set up a courtesy website where employers can post available postions suitable for new computing PhD's. This site is available at http://cifellows.org/opportunities.

An additional courtesy site has been set up for computing PhD's to post their profiles and availability. This website is available at http://cifellows.org/profiles. We encourage employers and candidates to make use of these complimentary services.

The Computing Community Consortium (CCC) and the Computing Research Association (CRA), with funding from the National Science Foundation, announce a program for new PhD graduates to obtain one-to-two year postdoctoral positions

CIFellows Project overview

- Established in 2009 with NSF/ CISE funding
- Provides recent Ph.D.s in computer science (and allied fields) post-doctoral positions
- Positions span one to two years
- Goal is to retain new Ph.D.s in research & teaching during difficult economic times
- 60 CIFellows funded in 2009
  - 19 left the program by the end of year I, most with permanent positions, many with tenure-track faculty appointments
  - 41 continued for a second year
- Additional 47 CIFellows funded in 2010
- Have announced a call for 2011-12 CIFellowships

Computing Innovation Fellows Project

Home CRA CCC CISE

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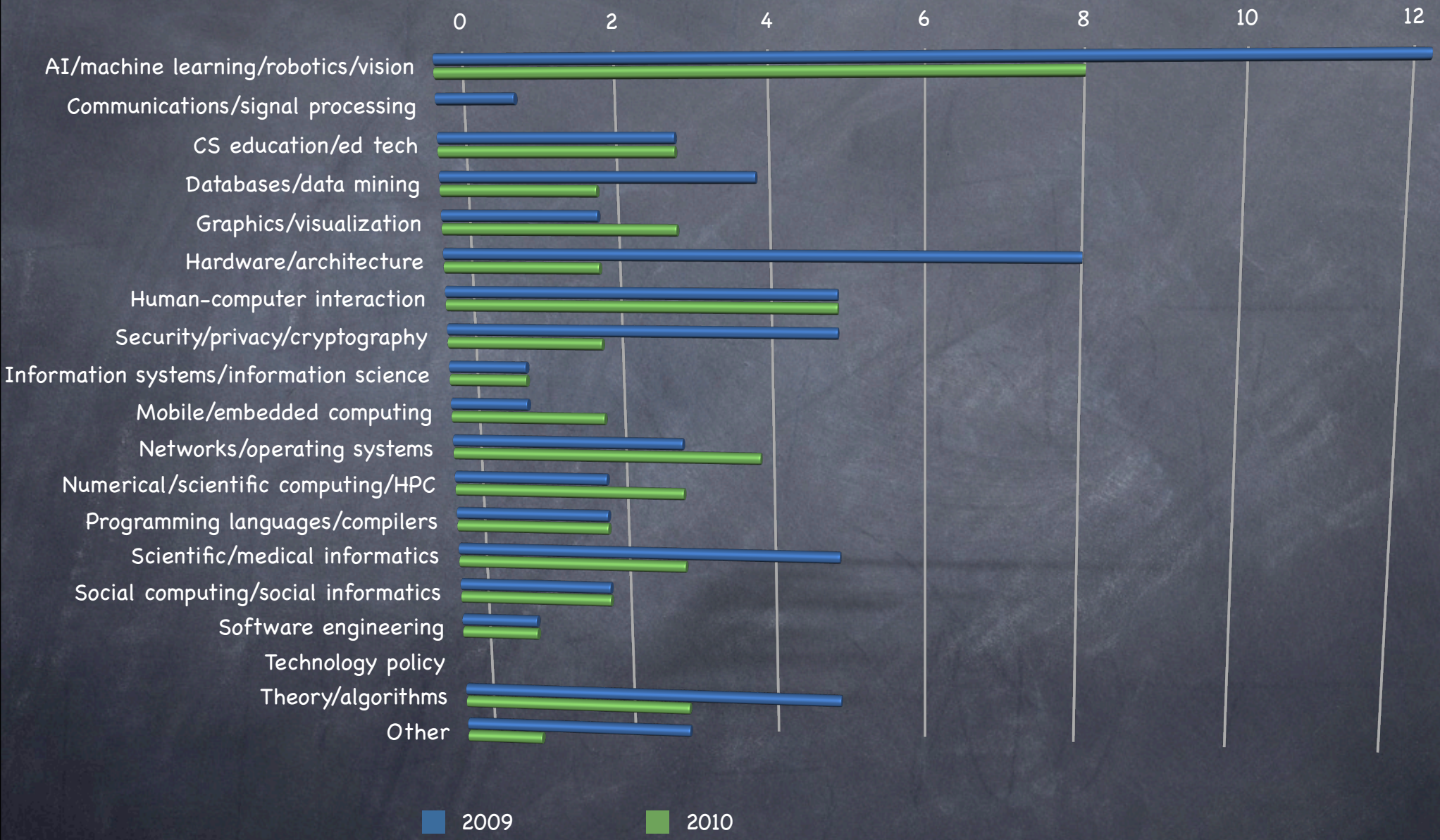
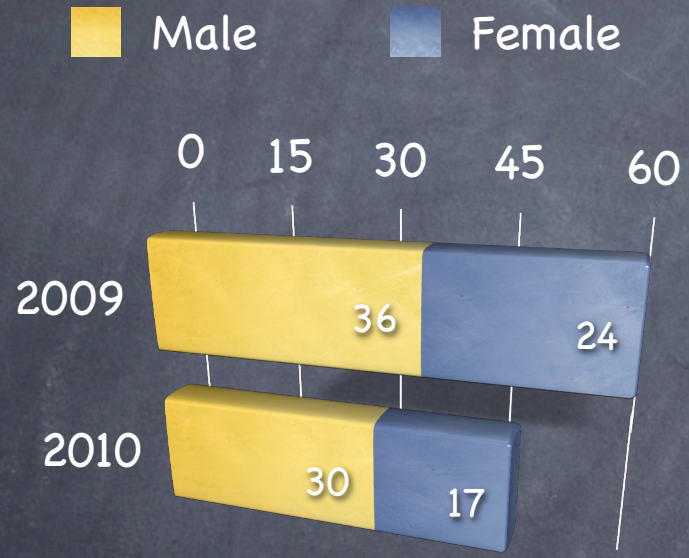
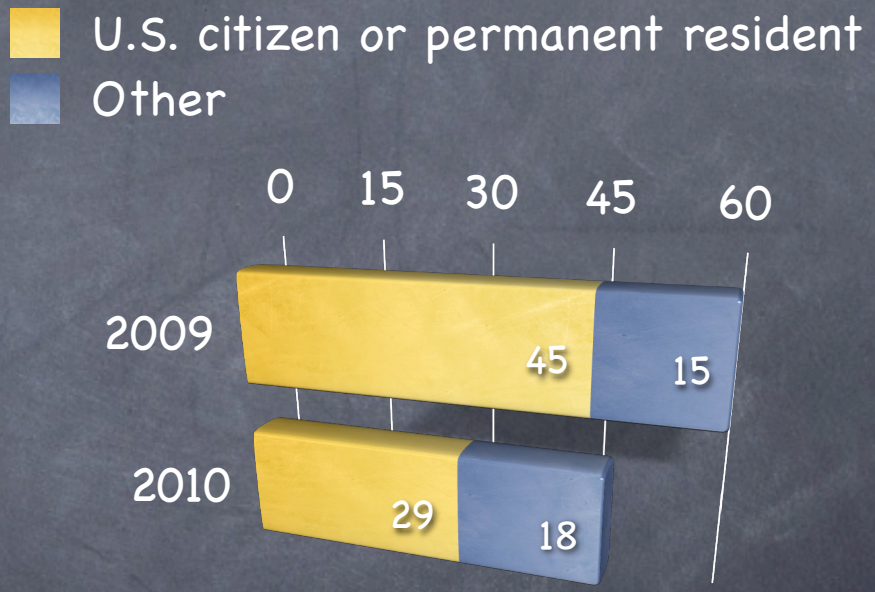
2009 & 2010 CIFellows Projects



Demographics

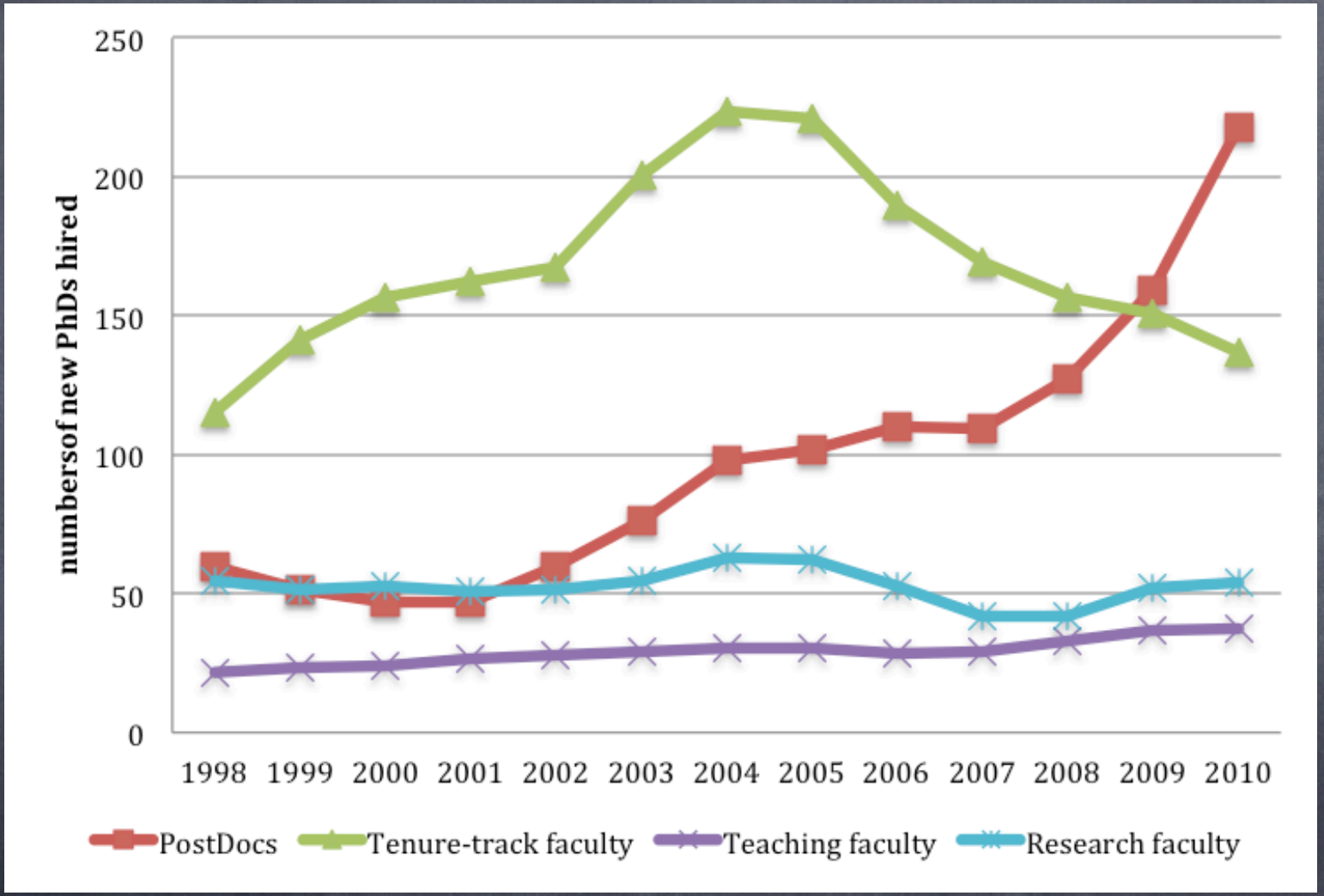




Three early successes

CIFellow	Mentor	CIFellow's current status
Thomas Schmid UCLA 	**Prabal Dutta** U of Michigan EECS 	THE UNIVERSITY OF UTAH **Assistant Professor** Electrical & Computer Engineering
Jennifer Vaughan UPenn 	**Yiling Chen** Harvard CS 	**Assistant Professor** Computer Science
Sitaram Asur Ohio State 	**Bernardo Huberman** HP Labs 	LABS hp **Researcher** Social Computing Lab

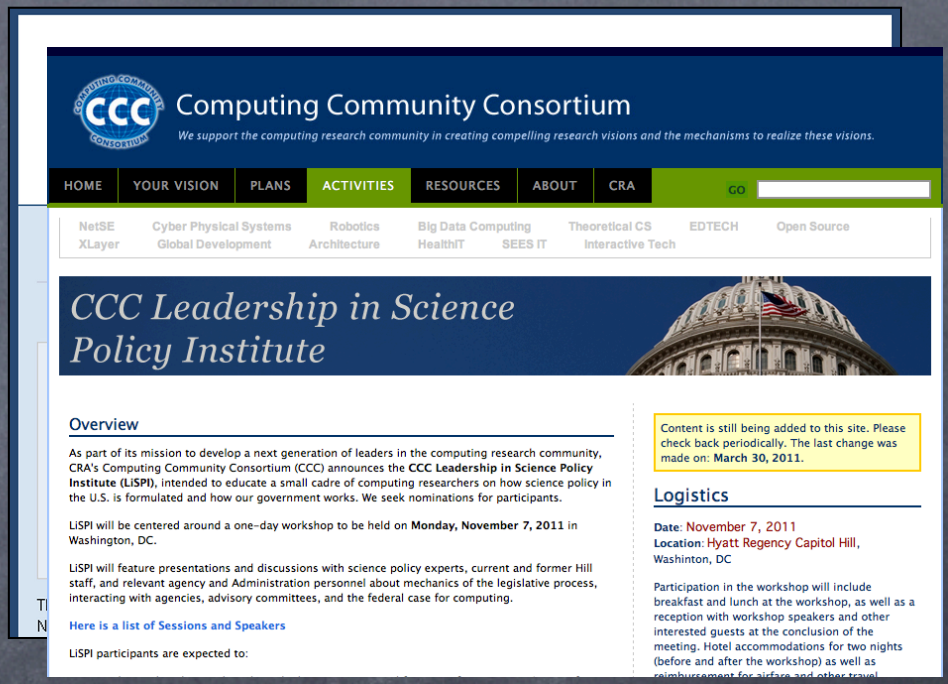
Postdocs in computing



Seeking your input: http://cra.org/postdocs

Leadership development

- Computing Innovation Fellows (CIFellows)
- Leadership in Science Policy Institute



Visioning for the future

- White papers
- Research visions sessions at conferences...

Computing Community Consortium

We support the computing research community in creating compelling research visions and the mechanisms to realize these visions.

HOME | YOUR VISION | PLANS | ACTIVITIES | RESOURCES | ABOUT | CRA | GO

Research Visions

Call for Visionary Conference Tracks

The Computing Community Consortium (CCC) is sponsoring an initiative to bring special "Challenges and Visions" tracks to leading computer science research conferences. The goal of this initiative is to help conferences reach out beyond the usual research papers that present completed work and to seek out papers that present ideas and visions that can stimulate the research community to pursue new directions.

Conferences may request CCC sponsorship of such tracks along with a CCC grant that provides for prize money for the top 3 papers (first prize $1000, second prize $750, and third prize $500, to be awarded as travel grants). (See below for details about selecting and awarding these prizes.)

Papers in a "Challenges and Visions" track should be open-ended, possibly "outrageous" or "wacky", and present new problems, new application domains, or new methodologies that are likely to stimulate significant new research. The CCC is seeking papers (roughly 4 pages in length) so that the ideas can be referenced after the conference is over.

After the conference, the CCC will post links to the track papers on its Challenges and Visions web page and help disseminate these ideas broadly in the computer science research community.

Requests for CCC sponsorship should include information on the conference and a proposed list of program committee members for the track. We provide below a prototype call for papers and suggestions regarding the review process. Proposals should be sent to Erwin Gianchandani, the CCC Director, at erwin@cra.org.

Prior Vision Tracks

- Outrageous Ideas and Visions (OIV) session, at the 5th Biennial Conference on Innovative Data Systems (CIDR), January 2011, Asilomar, CA
  - CCC Blog Post
  - Session Information Page
- Research Vision session, at the 9th Symposium on Operating Systems Design and Implementation (OSDI), October 2011, Vancouver, BC, Canada
  - CCC Blog Post
  - Session Information Page

See the full list.

...And lots of "visioning activities"

Community visioning activities	Participants	Organizations
Networking science & engineering	109	44
Cyber-physical systems	100	47
Robotics	141	79
"Big data" computing	81	46
Theoretical computer science	39	26
Global development (ICT4D)	56	37
Learning technologies	55	30
Health information technology	121	102
Cross-layer reliability	121	45
Free and open source software	42	35
Advancing computer architecture	In progress	
Interactive technologies	In progress	
Sustainability + IT	In progress	

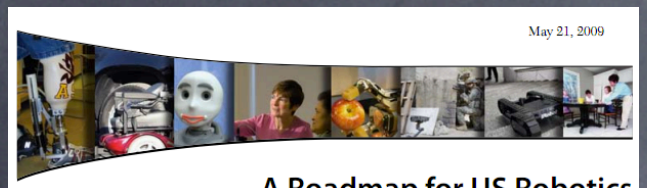
Yahoo!

NSF, ONC, NLM, NIST, AHRQ

Canada GRAND, ACM CHI

Open RFP for **community-driven** visioning

Robotics as an example



May 21, 2009

A Roadmap for US Robotics

From Internet to Robotics

Organized by

Georgia Institute of Technology

University of Southe

Johns Hopkin

University of P

University of Californ

Rensselaer Polytech

University of Massachus

Univ

Carnegie Mell

Tech

Sponsored by

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

July 21, 2010

M-10-30

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Peter R. Orszag
Director, Office of Management and Budget

John P. Holdren

Office of Science and Technology Policy

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RTD2: Research for Robotics

Subscribe

Posted by Tom Kalil and Sridhar Kota on September 15, 2010 at 03:09 PM EDT

In July, the heads of the Office of Management and Budget and the Office of Science and Technology Policy identified robotics as one of the Administration's R&D priorities for the President's FY2012 budget.

Robotics is an important technology because of its potential to advance national needs such as homeland ... medicine, healthcare, space exploration, environmental monitoring and remediation, ...vanced manufacturing, logistics, services, and agriculture. Robotics is also nearing a tipping ... usefulness and versatility as technologies such as software, chips, and computer vision ...e.

...working with Federal agencies and the research community to identify concrete steps that the ...an take to promote U.S. leadership in robotics.

...rt, five agencies teamed up to issue a joint solicitation for small business research for Robotics ...opment and Deployment (RTD2). Small businesses can apply for research funding for a wide ...luding robot-assisted rehabilitation, robotics for drug discovery, and robots that can disarm

...e to come in the months ahead from a newly energized and collaborative Federal robotics

...ty Director for Policy in the White House Office of Science and Technology Policy

...ssistant Director for Advanced Manufacturing in the White House Office of Science and

Trying to replicate success with learning technologies, through discussions with ED and NSF leaders

4 meetings during summer 2008

Roadmap published May 2009

Extensive discussions between visioning activity leaders & agencies

agencies to include robotics in FY 12 budgets

National Robotics Initiative (NRI) is included in President's FY 12 budget request

Henrik Christensen
Georgia Tech

Health information technology

- Following ARRA, NSF asked CCC to organize workshop
- Computer scientists, systems engineers, social scientists, care practitioners
- Produced a report summarizing key research questions and directions

- From data to knowledge to action -- enabling evidence-based healthcare
- Empowering people -- providers and consumers -- improves healthcare quality
- Computer-based augmentation of human learning, reasoning, decision-making, and physical motion significantly enhances human capabilities
- Healthcare is a complex, large-scale, adaptive distributed evolving system
- The Importance of Collaborative Government Investment

Sustainability + IT

- NSF/CISE recently asked CCC to run a workshop on sustainability
- Computer scientists, systems engineers, social scientists, sustainability scientists
- Produced a report summarizing key research questions and directions

- Defining sustainability
- Routine uses of CISE for sustainability
- CISE research to further sustainability
  - "Big data"
  - Modeling & simulation
  - Optimization
  - Intelligent systems
  - Cyber-physical systems
  - Human-centered & social computing
  - Privacy & security
  - Systems engineering & systems integration
  - Green IT
- The power of applied problems
- Collaboration & interdisciplinary research
- Education & workforce development
- The importance of collaborative Federal investment

Data analytics

- Overview
- eScience
- Healthcare
- Energy
- Education
- New Transp
- Intelligenc
- New Biolog
- Robotics & response

Systems biology. As the NAS report stated, "Improved measurement technologies and

Nearly 2500 years ago, Hippocrates kicked off a revolution in healthcare by calling for the careful collection and recording of evidence about patients and their illnesses. This call—which first introduced the goal of sharing data among physicians to provide the best care possible for patients—established a foundation for the evolution of modern healthcare. Although 25 centuries have passed since Hippocrates' call, we have not yet attained the dream of true evidence-based healthcare. Large quantities of data about wellness and illness continue to be dropped on the floor, rather than collected and harnessed to optimize the provision of care. We are simply not yet doing the best that we can.

We now stand at the brink of a potential revolution in data-centric healthcare, enabled by advances in computer science. Such a revolution promises to enhance the quality of healthcare while cutting costs, and, more generally, enabling physicians to do the very best that is possible with realistically bounded healthcare resources. Doing the best that can be done with available resources aligns with the core promise that all physicians make when they solemnly raise their hand and recite the Hippocratic Oath upon receipt of their medical degree.

Enabling this vision of true evidence-based healthcare will require critical investments for translating key methods and insights into working systems, as well as for advances in core computer science research and engineering to address key conceptual bottlenecks and opportunities.

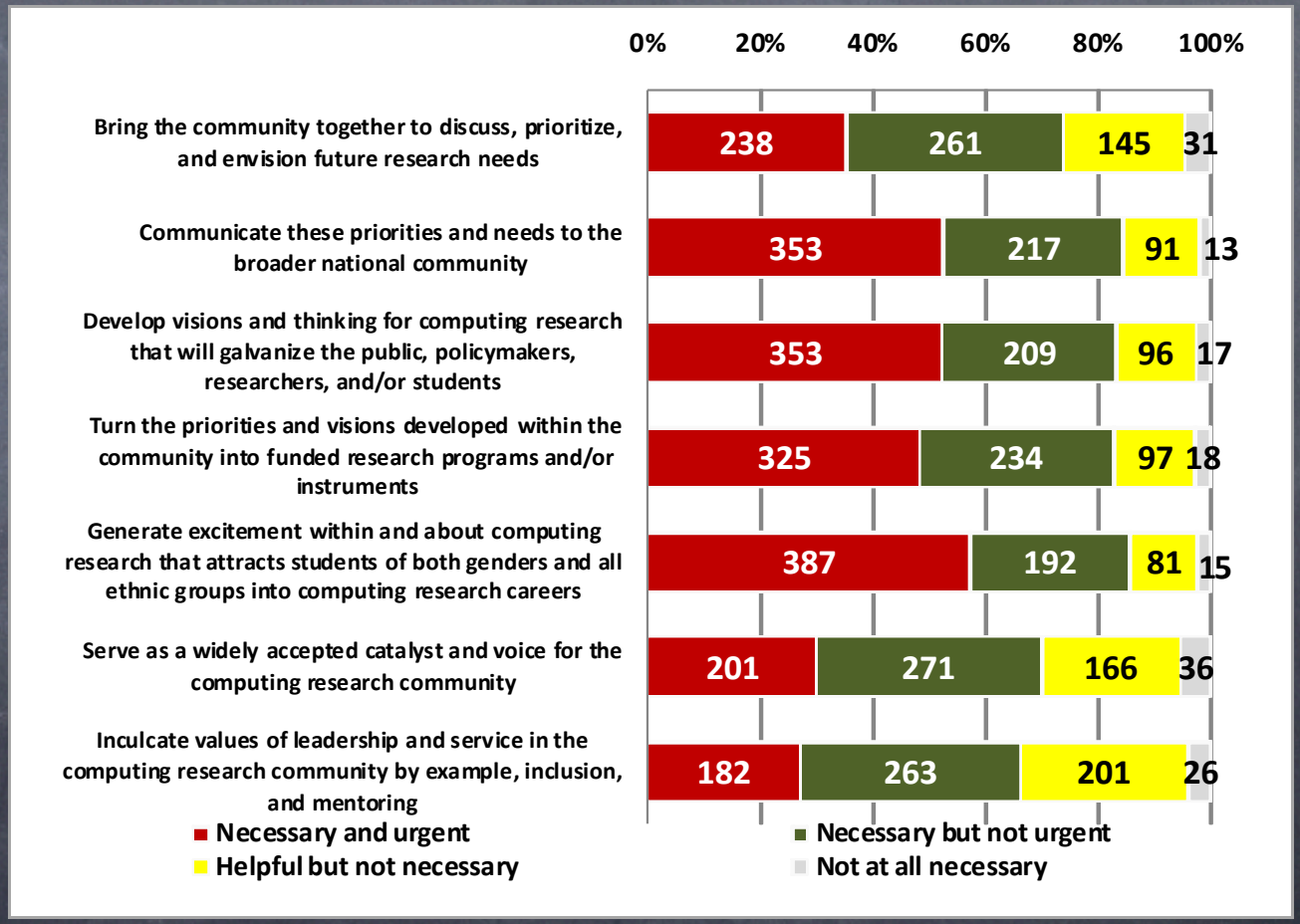
Collecting and analyzing data collected on health and illness promises to enhance the quality and efficacy of healthcare, and to enhance the quality and longevity of life. The collection and analysis of data can provide new insights about wellness and illness that can be operationalized. Data-centric methods allow us to transform *data* into *predictive models*. Predictive models can be used to generate forecasts with well-characterized accuracies about the future—or diagnoses about states of a patient that we cannot inspect directly. Such forecasts or diagnoses can be harnessed within procedures that generate recommendations for *actions in the world*, and decisions about *when it is best to collect more information about a situation before acting*, considering the costs and time delays associated with collecting more information to enhance a decision.

The pipeline of *data to prediction to action* can be used to automate or provide decision support for accurate triage and diagnosis, to generate well-calibrated predictions about health outcomes,

The value of the CCC

- Small, nimble organization
- Unique components to the mission
- Provides a "leadership voice" for the community

How necessary is it to have within the U.S. computing research community an organization designated to perform one or more of the following activities?



--SRI International

A community effort -- we need you!

- Visioning activities, white papers on specific research areas
- Challenges & Visions Sessions at conferences
- Short videos for undergraduates
- CCC Blog contributions
- Computing Research Highlights of the Week
- ...Tell us what else...

- And join us!

Questions?

- E-mail: erwin@cra.org
- Phone: (202) 266-2936
- Online: www.cra.org/ccc