

The Broadening of Computer Science

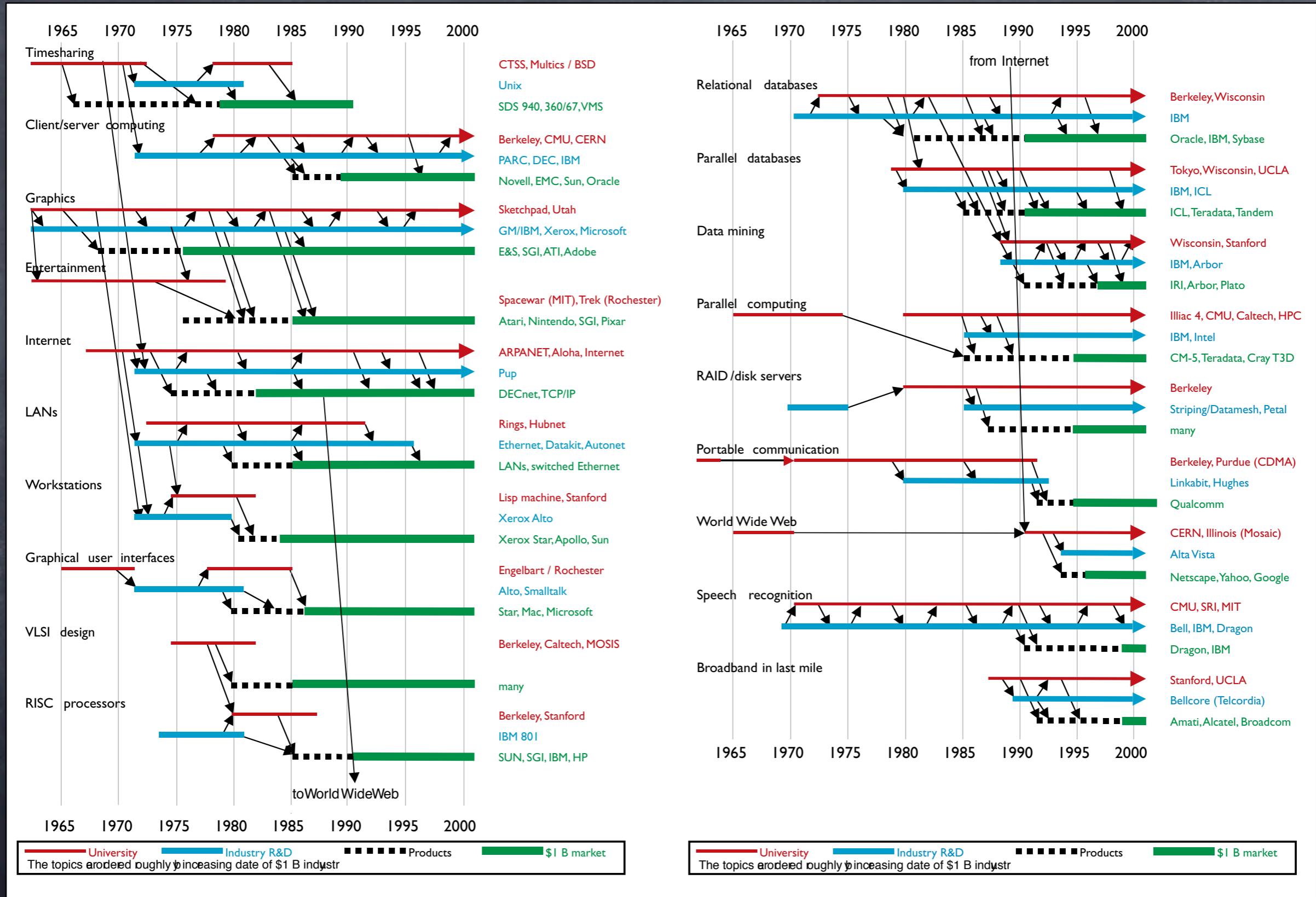
Dr. Erwin Gianchandani
Director, Computing Community Consortium
Computing Research Association

UVa Dept. of Computer Science
Sept. 10, 2010



The CCC & CIFellows Project

Research has built the foundation...



...We must work together to ensure that continues

The cover of the September 9, 2010, issue of *Nature* features a large, bold title "nature" at the top. Below it, the volume and issue number are listed: "Vol 467 | Issue no. 7312 | 9 September 2010". A sub-headline "Science scorned" is prominently displayed. The main article, "The anti-science strain pervading the right wing in the United States is the last thing the country needs in a time of economic challenge," begins with a quote from Glenn Beck: "The four corners of decent government, academia, science and media. Those institutions are now corrupt and entirely devoid of decent. That's how they perniciously propagate themselves; it is how they prosper." The article discusses the growing anti-science movement on the American right, its impact on policy issues like stem-cell research and environmental regulation, and the role of conservative media figures like Limbaugh and Beck. Another article, "A destabilizing DNA sequencing scandal," reports on a legal investigation into scientific misconduct involving a researcher named Bernhard, highlighting the importance of integrity in science.

"Science scorned." *Nature* 467(7312): 133 (2010).

"As educators, scientists should redouble their efforts to promote rationalism, scholarship, and critical thought among the young, and engage with both the media and politicians to help illuminate the pressing science-based issues of our time."

Computing was at a crossroads...

- ⦿ In the mid-2000s, NSF leaders and computing research leaders had similar deep concerns
 - ⦿ The Federal commitment to research in general, and to computing research in particular
 - ⦿ Public and policymaker perception that “computer science” is “yesterday’s news”
 - ⦿ 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

...So something was done about it...

- ⦿ 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.”

...NSF asked CRA to create a “CCC”

- 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 Council: a broad slice

- ⦿ Director: Erwin Gianchandani
- ⦿ Chair: Ed Lazowska
- ⦿ Terms ending 2013
 - ⦿ Randy Bryant
 - ⦿ Lance Fortnow
 - ⦿ Hank Korth
 - ⦿ Eric Horvitz
 - ⦿ Beth Mynatt
 - ⦿ Fred Schneider
 - ⦿ Margo Seltzer
- ⦿ Terms ending 2012
 - ⦿ Stephanie Forrest
 - ⦿ Chris Johnson
 - ⦿ Anita Jones
 - ⦿ Frans Kaashoek
 - ⦿ Ran Libeskind-Hadas
 - ⦿ Robin Murphy
- ⦿ Terms ending 2011
 - ⦿ Bill Feiereisen
 - ⦿ Susan Graham (vice-chair)
 - ⦿ Dave Kaeli
 - ⦿ John King
 - ⦿ Bob Sproull
- ⦿ Ex-officio
 - ⦿ Andrew Bernat
- ⦿ Rotated off
 - ⦿ Dick Karp, 2010
 - ⦿ Andrew McCallum, 2010
 - ⦿ Dave Waltz, 2010
 - ⦿ Greg Andrews, 2009
 - ⦿ Peter Lee, 2009
 - ⦿ Karen Sutherland, 2009

Major continuing activities

☛ Presentations

The Computing Community Consortium:
Stimulating Bigger Thinking

Ed Lazowska

Bill & Melinda Gates Chair in
Computer Science & Engineering
University of Washington

Chair, Computing Community Consortium
Tapia Conference Career Workshop
April 2009

<http://www.cra.org/ccc/>



Major continuing activities

- ➊ Presentations
- ➋ Articles

The Computing Community Consortium

V viewpoints

DOI:10.1145/1378704.1378714

Ed Lazowska

Viewpoint
**Envisioning the Future
of Computing Research**

Advances in computing have changed our lives—the Computing Community Consortium aims to help the research community continue that lineage.

HOW CAN WE work together to establish, articulate, and pursue compelling visions for our field—visions that will shape the intellectual future of the field, that will catalyze research investment and public support, and that will attract the best and brightest minds of a new generation?

The National Science Foundation

many Internet hosts.

It was only 10 years ago that Deep Blue—a supercomputer by any definition—defeated world chess champion Garry Kasparov. Today, thanks more to progress in software than to progress in hardware, you can download for your PC a chess engine with a rating 10% higher than any human player. Most of the “futurist” cooper-

try: timesharing, computer graphics, networking (LANs and the Internet), personal workstation computing, windows and the graphical user interface, RISC architectures, modern integrated circuit design, RAID storage, and parallel computing. In each case, the role of federally sponsored research was clear.

The panel conducting this study is

Major continuing activities

- ⦿ Presentations
- ⦿ Articles
- ⦿ CCC Blog

The Computing Community Consortium

viewpoints

THE COMPUTING COMMUNITY CONSORTIUM

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Recent Posts

Computing Research that Changed the World: Reflections and Perspectives

Computer Engineer Barbie!

Where the jobs are ...

"Exponentials R Us" – Seven Computer Science Game-Changers from the 2000's, and Seven More to Come

A Report on the Cross-layer Reliability Visioning Study Group

A Report on the Discovery and Innovation in Health IT Workshop

JAN 4 Where the jobs are ... Filed Under Uncategorized, pipeline, resources

Employment growth within the 10 BLS major occupational groups, 2008-18

Occupational Group	Growth (%)
Computer Occupations	10.8%
Management Occupations	10.0%
Sales Occupations	9.8%
Service Occupations	9.0%
Office Occupations	7.8%
Construction Occupations	7.0%
Manufacturing Occupations	6.0%
Agriculture Occupations	5.0%
Transportation Occupations	4.0%
Other Occupations	1.0%

Employment growth within the 8 BLS "Professional and related" occupations, 2008-2018

Occupational Group	Growth (%)
Computer Occupations	22.8%
Management Occupations	19.0%
Sales Occupations	18.0%
Service Occupations	16.0%
Office Occupations	15.0%
Construction Occupations	14.0%
Manufacturing Occupations	13.0%
Agriculture Occupations	12.1%

Every second year, the US Bureau of Labor Statistics provides a ten-year forecast of job growth in all fields of employment. The most recent forecast, released in November 2009 and covering the period 2008-2018, may be found here (pdf). Among the highlights:

- Among the 10 major BLS occupational groups, the "Professional and related" category (which includes computer science occupations) is projected to grow by the largest percentage between now and 2018.

Major continuing activities

- ⦿ Presentations
- ⦿ Articles
- ⦿ CCC Blog
- ⦿ Computing Research
“Highlight of the Week”

The screenshot shows a blog post from the CCC blog. The header features the CCC logo and the text "viewpoints" and "CCC BLOG". Below the header, the main content area has a blue banner with the text "Computing Community Consortium" and a subtitle "We support the computing research community in creating compelling research visions and the mechanisms to realize these visions." The main article title is "COMPUTING RESEARCH HIGHLIGHT OF THE WEEK [January 14 - 21, 2010]" and the specific highlight is "One Keypad per Child" Lets School Children Share Screen to Learn Math. The article includes a photo of two children sharing a computer, a quote from Joyojeet Pal, and a description of the MultiLearn system. On the right side of the page, there are "Relevant Links" (Press Release, Project Web Page, Research Papers, Media Contact) and "Keywords" (educational technology, information technology for development, University of Washington). At the bottom, there are social sharing options for RSS, Email, Embed, and Share.

Major continuing activities

- ⦿ Presentations
- ⦿ Articles
- ⦿ CCC Blog
- ⦿ Computing Research “Highlight of the Week”
- ⦿ Community visioning exercises

The screenshot shows the CCC website homepage. At the top, there's a banner with the text "The Computing Community Consortium". Below it, a section titled "viewpoints" features a large image of a person's face. To the right, there's a "CCC BLOG" section with a blue header. The main content area has a dark blue header with the CCC logo and the text "Computing Community Consortium" and "We support the computing research community in creating compelling research visions and the mechanisms to realize these visions.". Below this, a large headline reads "What questions shape our intellectual future?". A sidebar on the left contains a list of news items, and a sidebar on the right features a "Highlight of the Week" section with a thumbnail image of students using a computer.

viewpoints

CCC BLOG

Computing Community Consortium

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

What questions shape our intellectual future?

Click on the tabs below to see some of these activities.

NetSE Cyber Physical Systems Robotics Big Data Computing Theoretical CS

FOSS Online Education XLayer Global Development ACAR HealthIT

Computing Research that Changed the World

This invitation only symposium, "Computing Research that Changed the World: Reflections and Perspectives," was organized by the Computing Community Consortium in collaboration with Congressman Bart Gordon (D-TN), Congressman Ralph Hall (R-TX), Congressman Daniel Lipinski (D-IL), Congressman Vern Ehlers (R-MI), Congressman Rush Holt (D-NJ) and Sen. Jay Rockefeller (D-WV). It was held in the Library of Congress on March 25, 2009.

Highlight of the Week

New Search Technique for Images and Videos

University of Washington computer science undergraduates have developed a system that lets up to four students share a single computer to do interactive math problems. Early tests show that students using

Major special initiatives

- “Transition Team” white papers

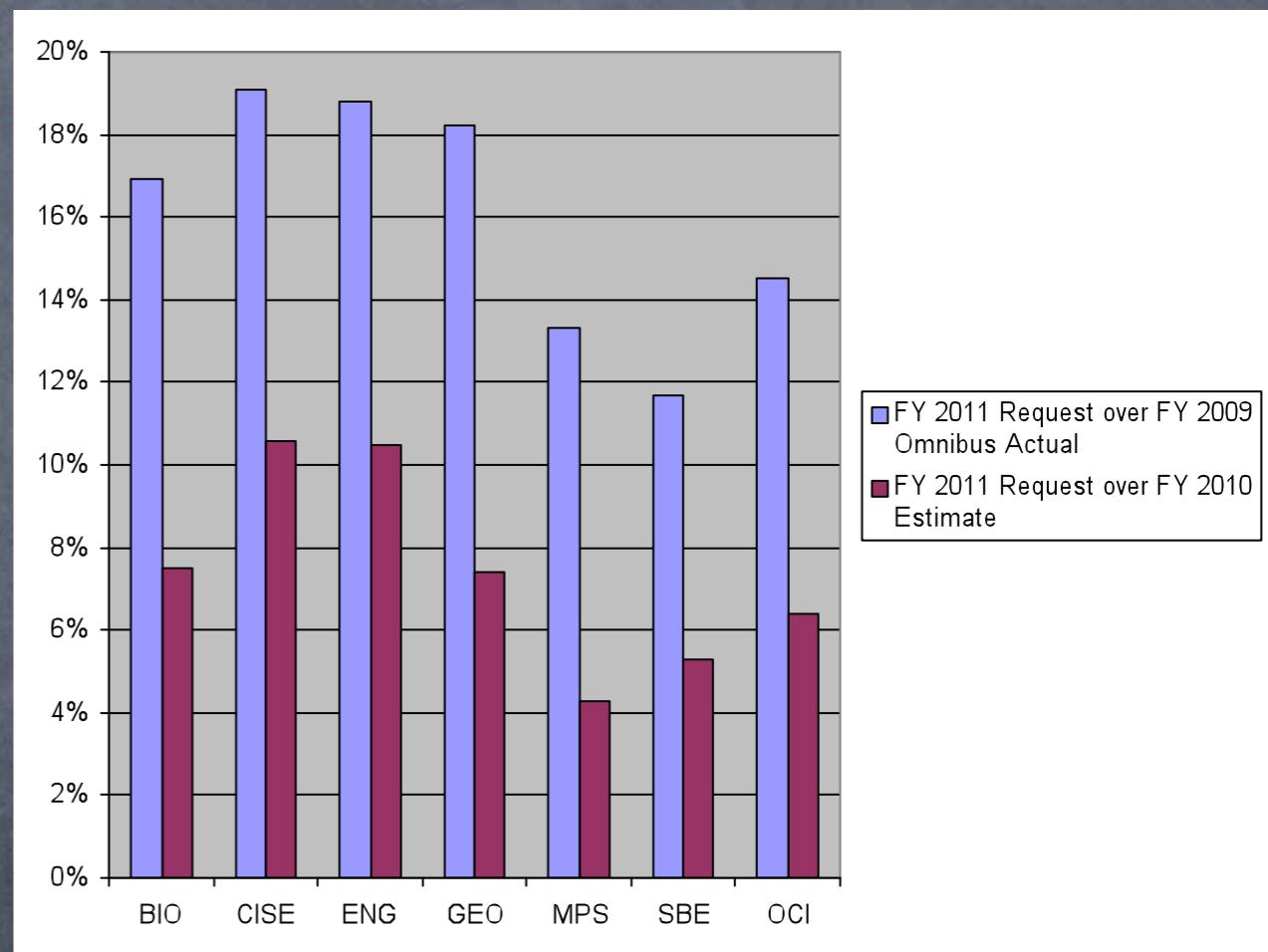
The screenshot shows the homepage of the Computing Community Consortium (CCC) website. The header features the CCC logo and the text "Computing Community Consortium" with the subtitle "We support the computing research community in creating compelling research visions and the mechanisms to realize these visions." Below the header is a navigation menu with links for HOME, YOUR VISION, PLANS, ACTIVITIES (which is highlighted in green), RESOURCES, ABOUT, CRA, and GO. The main content area is titled "Computing Research Initiatives for the 21st Century" and lists several white papers:

- Fundamental Research in Engineering ([Word version](#))
(Ed Lazowska, University of Washington and Peter Lee, Carnegie Mellon University)
- Information Technology R&D and U.S. Innovation ([Word version](#))
(Peter Harsha, Computing Research Association, Ed Lazowska, University of Washington, and Peter Lee, Carnegie Mellon University)
- Re-Envisioning DARPA ([Word version](#))
(Peter Lee, Carnegie Mellon University and Randy H. Katz, UC Berkeley)
- Unleashing Waves of Innovation: Transformative Broadband for America's Future ([Word version](#))
- Infrastructure for eScience and eLearning in Higher Education ([Word version](#)) ([Unattributed PDF](#))
(Ed Lazowska, University of Washington, Peter Lee, Carnegie Mellon University, Chip Elliott, BBN Technologies, and Larry Smarr, UCSD)
- Security is Not a Commodity: The Road Forward for Cybersecurity Research ([Word version](#))
(Stefan Savage, UC San Diego, and Fred B. Schneider, Cornell University)
- Information Technology and America's Energy Future ([Word version](#))
(David Waltz, Columbia University, and John King, University of Michigan)
- Surface Transportation 3.0 ([Word version](#))
(Sebastian Thrun, Stanford University, and Henry Kelly, Federation of American Scientists)
- "Smart Grid": R&D for an Intelligent 21st Century Electrical Energy Distribution Infrastructure ([Word version](#))
(Randy H. Katz, UC Berkeley)
- Synthetic Biology ([Word version](#))
(Drew Endy, Stanford, and Ed Lazowska, University of Washington)

“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

A role in FY 11?



NSF budget numbers, by Directorate

Major special initiatives

- “Transition Team” white papers

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Major special initiatives

- “Transition Team” white papers
- Library of Congress Symposium



Major special initiatives

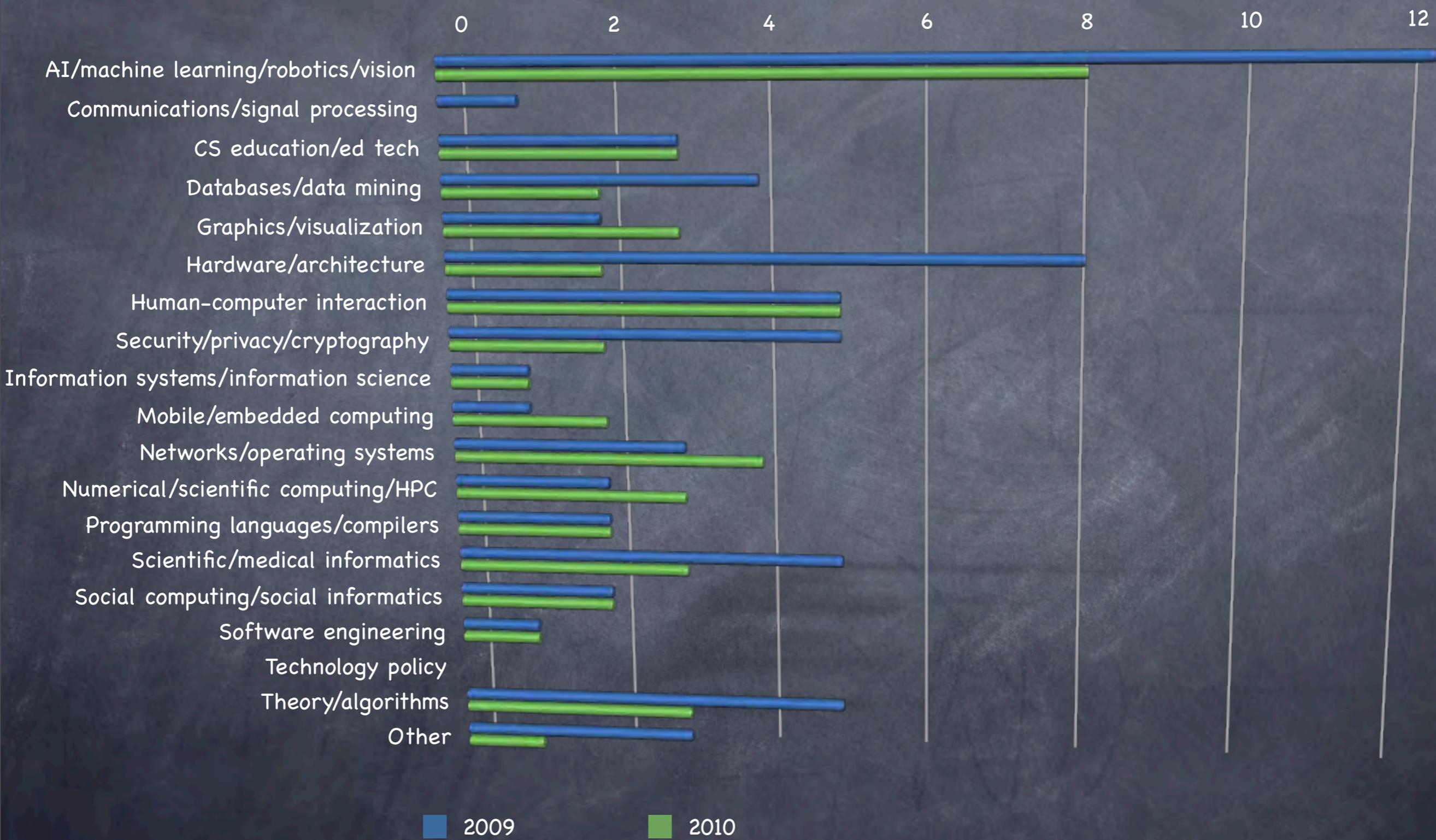
- “Transition Team” white papers
- Library of Congress Symposium
- Computing Innovation Fellows (CIFellows)



The screenshot shows the homepage of the Computing Innovation Fellows Project. At the top, there's a banner for "The LIBRARY of CONGRESS". Below it, logos for CRA (Computing Research Association), NSF (National Science Foundation), and CCC (Computing Community Consortium) are displayed. The main title "Computing Innovation Fellows Project" is centered above a navigation bar with links for Home, CRA, CCC, and CISE. A prominent red message states "The 2009 Computing Innovation Fellows have been selected!". Below this, a link leads to a press release. A message congratulates the selected fellows and encourages them to check out the forum. Another section discusses a courtesy website for employers to post job opportunities, with a link to <http://cifellows.org/opportunities>. A final note mentions a courtesy site for computing PhD profiles, available at <http://cifellows.org/profiles>.

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

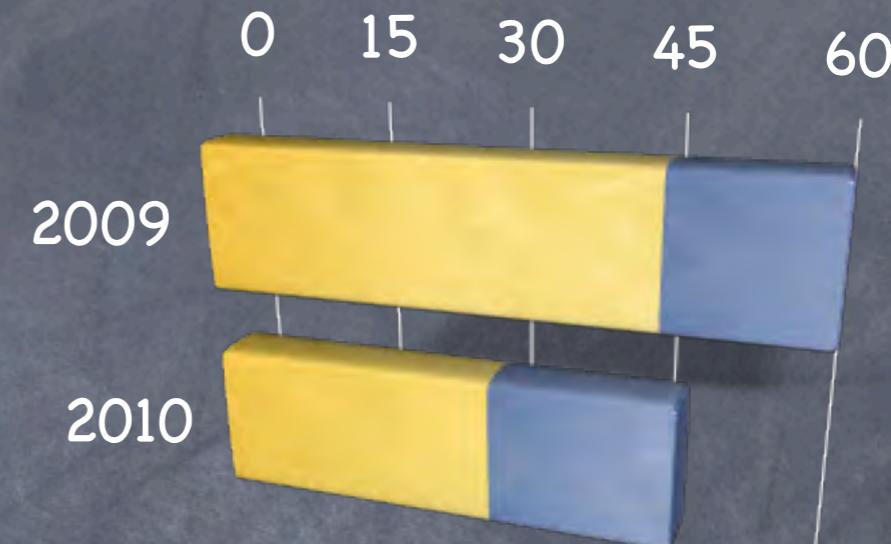
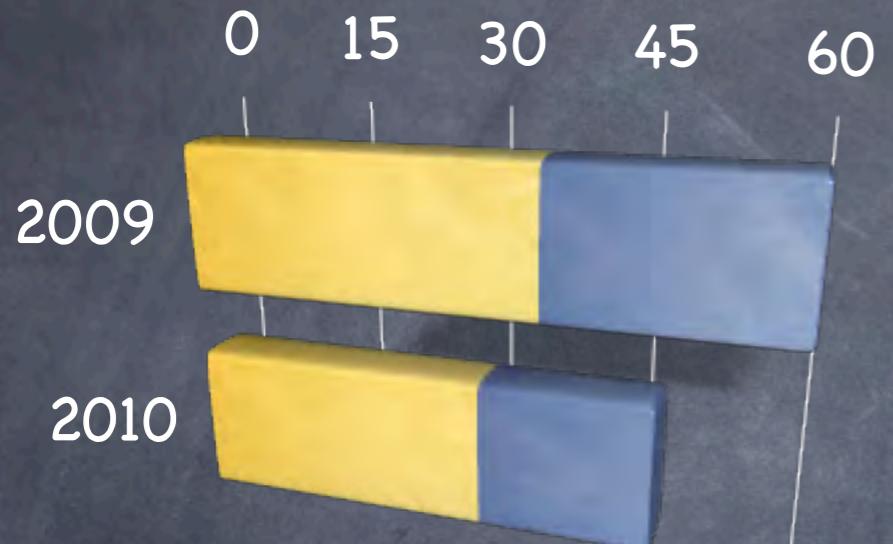
2009 & 2010 CIFellows Projects



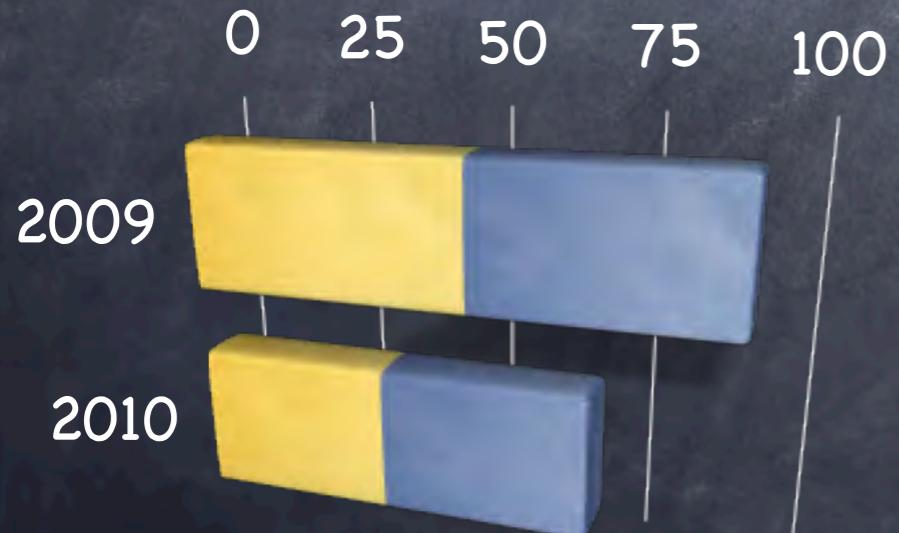
CIFellows Projects by the numbers

Male Female

U.S. citizen or permanent resident
Other



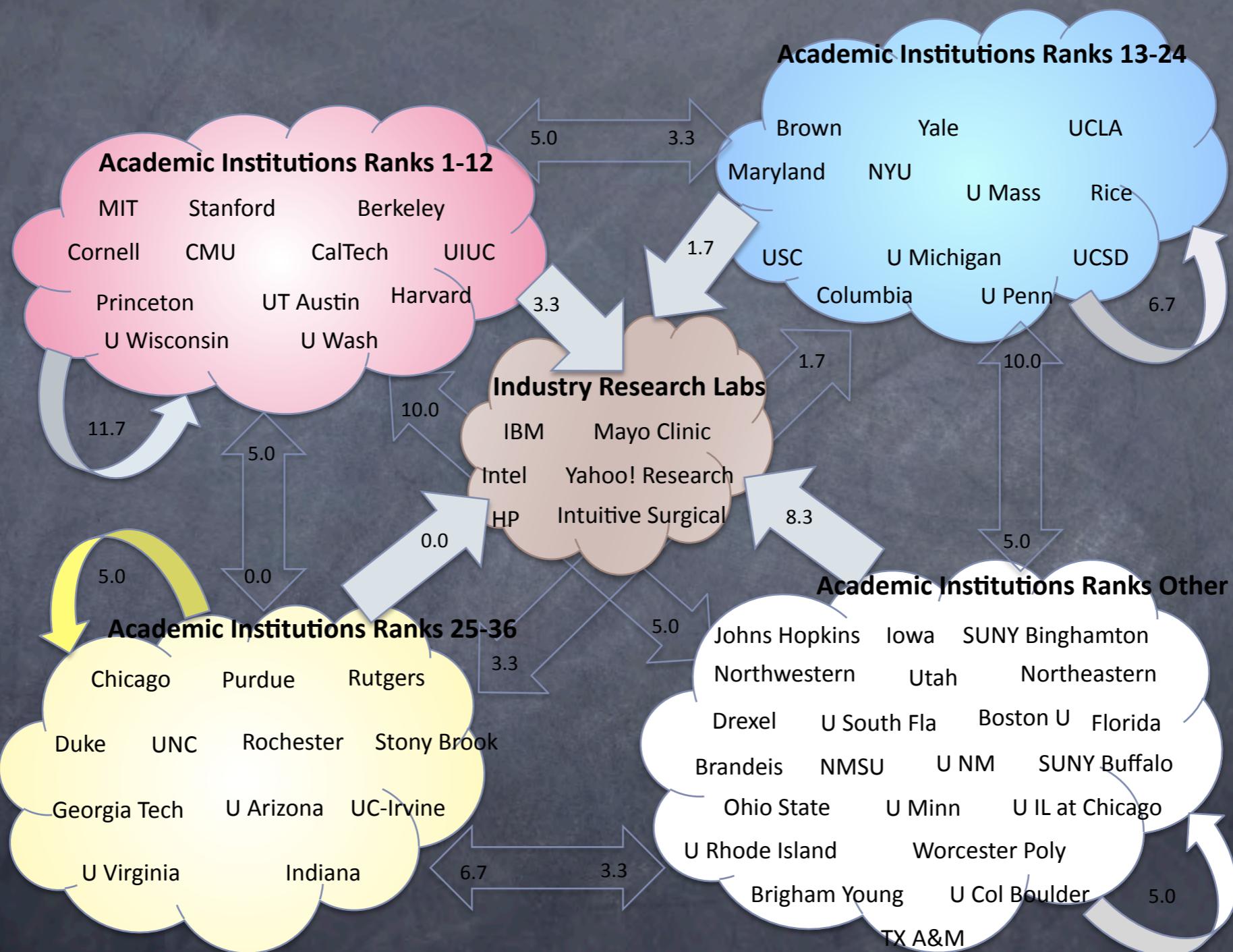
Ph.D. institutions
Mentoring organizations



Renewing Continuing



CIFellows Project I ('09) cross-flow



Major special initiatives

- “Transition Team” white papers
- Library of Congress Symposium
- Computing Innovation Fellows (CIFellows)



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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.](#)

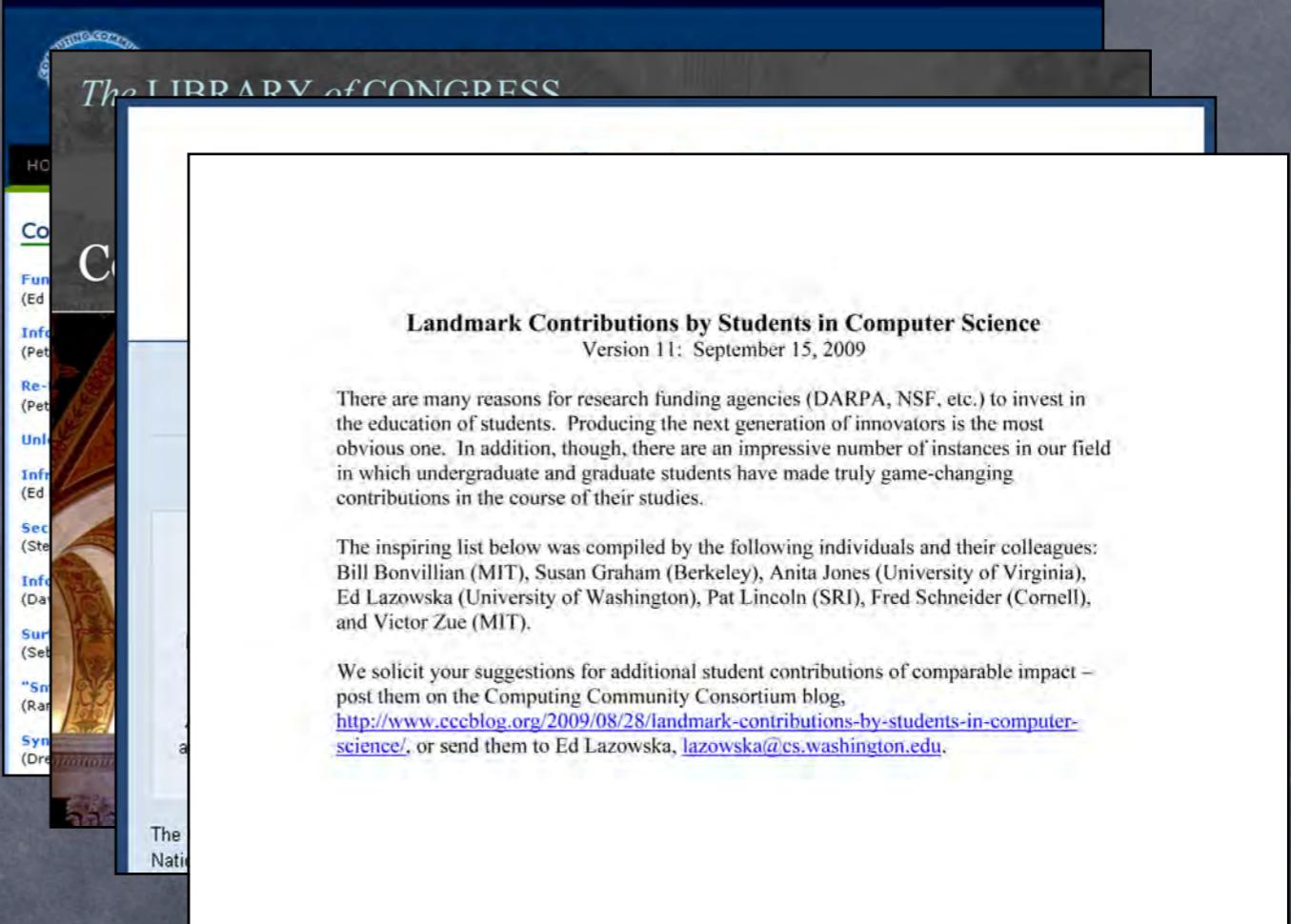
In the light of the response that the CIFellows has received, we have set up a courtesy website where employers can post available positions suitable for new computing PhD's. This site is available at <http://cifellows.org/opportunities>.

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

Major special initiatives

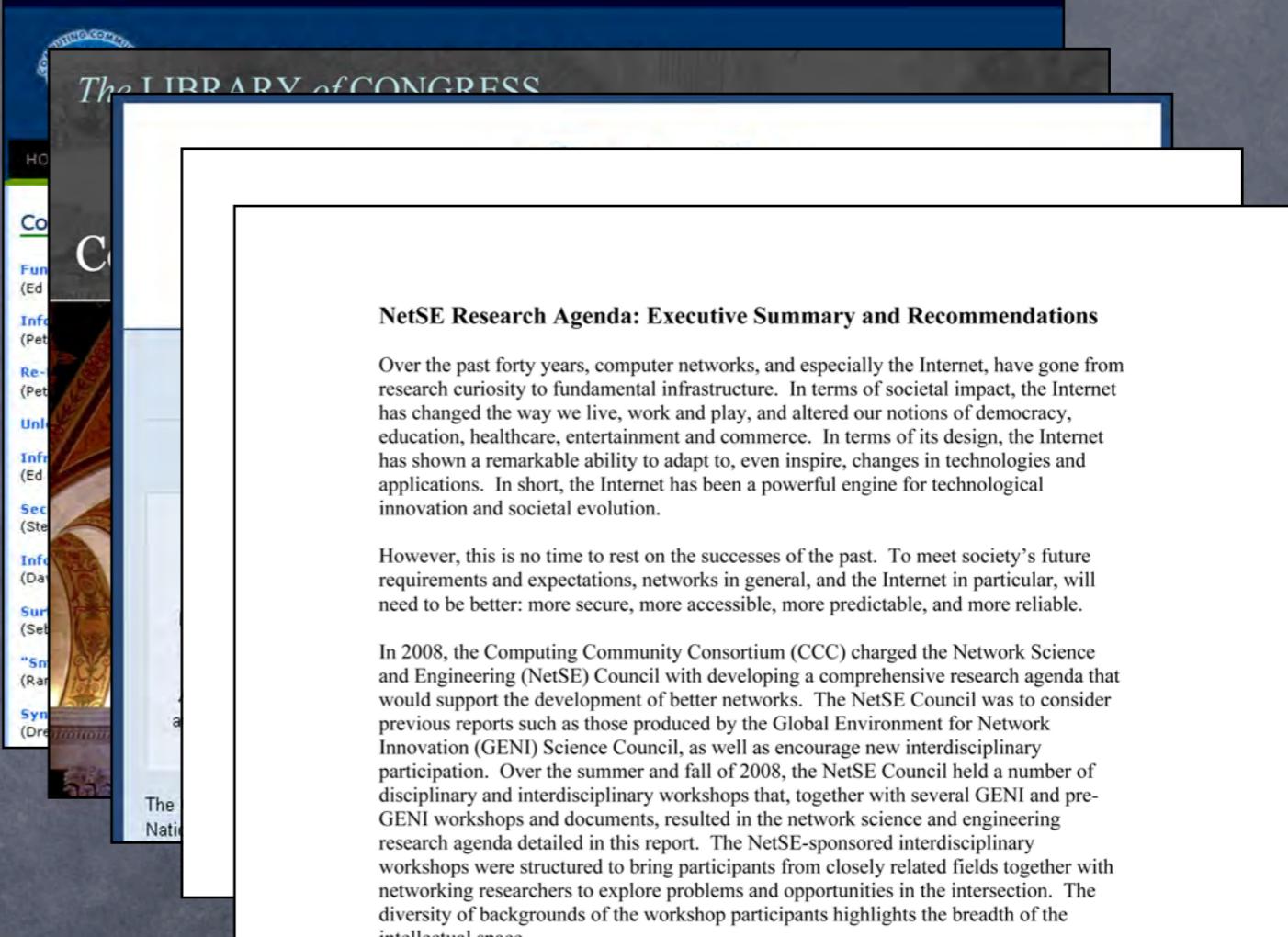
- “Transition Team” white papers
- Library of Congress Symposium
- Computing Innovation Fellows (CIFellows)
- Landmark Contributions by Students



The screenshot shows a webpage from the Library of Congress. At the top, there's a navigation bar with links like "HOME", "ABOUT", "COLLECTIONS", "SERVICES", "EDUCATION", and "SEARCH". Below the navigation, the text "The LIBRARY of CONGRESS" is displayed. The main content area has a title "Landmark Contributions by Students in Computer Science" followed by the subtitle "Version 11: September 15, 2009". A paragraph explains why research funding agencies invest in student education, noting the impact of undergraduate and graduate students. It then lists the individuals who compiled the inspiring list: Bill Bonvillian, Susan Graham, Anita Jones, Ed Lazowska, Pat Lincoln, Fred Schneider, and Victor Zue. Finally, it encourages suggestions for additional contributions and provides a link to the blog post: <http://www.eccblog.org/2009/08/28/landmark-contributions-by-students-in-computer-science/>.

Major special initiatives

- “Transition Team” white papers
- Library of Congress Symposium
- Computing Innovation Fellows (CIFellows)
- Landmark Contributions by Students
- NetSE Research Agenda



The screenshot shows a section of the Library of Congress website. At the top, there's a blue header bar with the text "The LIBRARY of CONGRESS". Below it, a sidebar on the left lists various reports and documents, including "NetSE Research Agenda: Executive Summary and Recommendations". The main content area contains the title of the report and its executive summary.

NetSE Research Agenda: Executive Summary and Recommendations

Over the past forty years, computer networks, and especially the Internet, have gone from research curiosity to fundamental infrastructure. In terms of societal impact, the Internet has changed the way we live, work and play, and altered our notions of democracy, education, healthcare, entertainment and commerce. In terms of its design, the Internet has shown a remarkable ability to adapt to, even inspire, changes in technologies and applications. In short, the Internet has been a powerful engine for technological innovation and societal evolution.

However, this is no time to rest on the successes of the past. To meet society's future requirements and expectations, networks in general, and the Internet in particular, will need to be better: more secure, more accessible, more predictable, and more reliable.

In 2008, the Computing Community Consortium (CCC) charged the Network Science and Engineering (NetSE) Council with developing a comprehensive research agenda that would support the development of better networks. The NetSE Council was to consider previous reports such as those produced by the Global Environment for Network Innovation (GENI) Science Council, as well as encourage new interdisciplinary participation. Over the summer and fall of 2008, the NetSE Council held a number of disciplinary and interdisciplinary workshops that, together with several GENI and pre-GENI workshops and documents, resulted in the network science and engineering research agenda detailed in this report. The NetSE-sponsored interdisciplinary workshops were structured to bring participants from closely related fields together with networking researchers to explore problems and opportunities in the intersection. The diversity of backgrounds of the workshop participants highlights the breadth of the intellectual space.

Major special initiatives

- ⦿ “Transition Team” white papers
- ⦿ Library of Congress Symposium
- ⦿ Computing Innovation Fellows (CIFellows)
- ⦿ Landmark Contributions by Students
- ⦿ NetSE Research Agenda
- ⦿ Health IT

The LIBRARY of CONGRESS

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

Discovery and Innovation in Health IT

This invitation only workshop, "Discovery and Innovation in Health IT," is sponsored by the National Science Foundation, the Office of the National Coordinator for Health Information Technology, the National Institute of Standards and Technology, the National Library of Medicine, the Agency for Healthcare Research and Quality, the Computing Community Consortium, and the American Medical Informatics Association. It will be held at the Parc 55 Hotel in San Francisco on October 29 and 30, 2009.

The talks and plenary discussions will be videotaped and a web presence will be developed to make the workshop material broadly available.

The goals of the workshop are to:

- Explore and define fundamental research challenges and opportunities in healthcare IT in both the near- and long-term;
- Provide opportunities for relevant academic and industrial researchers, healthcare practitioners and IT healthcare suppliers to identify mutual interests in healthcare IT, as they relate to both near- and long-term challenges and solutions;
- Identify a range of "model" proof-of-concept, integrative systems that might serve as motivating and unifying forces to drive fundamental research in healthcare IT and accelerate the transition of research outcomes into products and services;

The workshop will have four half-day sessions. Each of the first three sessions will have two plenary talks followed by small-group breakout discussions to define particular research challenges, multiple lines of attack, and possible test-beds or demonstration systems. Each of these sessions, which are further described subsequently, will end with short reports from the

Content is still being added to this site.
Please Check back periodically.
The last change was made on:
December 16, 2009.

Session Videos

HIT - Thursday Morning Op...

Reply/Registration

[Link to Reply/Registration Form](#)

Logistics

Date: October 29-30, 2009

...And lots of visioning activities

Community visioning activities	Participants	Organizations
NetSE	109	44
Cyber-physical systems	100	47
Robotics	141	79
Big data computing	81	46
Theoretical CS	39	26
Global development	56	37
Education technology	55	30
Health information technology	121	102
Cross-layer reliability	121	45
Free and open source software	42	35
Advancing computer architecture	New in 2010	
Interactive technologies	New in 2010	

What other topics should we cover?
Tell us!

OSTP's FY 12 priorities...



THE DIRECTOR

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

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
Director, Office of Science Technology Policy

SUBJECT: Science and Technology Priorities for the FY 2012 Budget

Scientific discovery, technological breakthroughs, and innovation are major engines for expanding the frontiers of human knowledge and are indispensable for promoting sustainable economic growth, improving the health of the population, moving toward a clean energy future, addressing global climate change challenges, managing competing demands on the environment, and safeguarding our national security.

This memorandum follows up on OMB Memorandum M-10-19 by outlining the Administration's science and technology (S&T) priorities for formulating FY 2012 Budget submissions to the Office of Management and Budget (OMB). These priorities for research and development (R&D) investments and other S&T investments build on priorities already reflected in the American Recovery and Reinvestment Act, the FY 2010 and 2011 Budgets, and key Administration policy guidance such as the President's *Strategy for American Innovation*. This memorandum also provides program guidance for S&T activities in Executive Departments and Agencies.

Prioritizing key S&T activities

...Aligning our activities



"In the 2012 Budget, agencies should focus on ... six challenges."

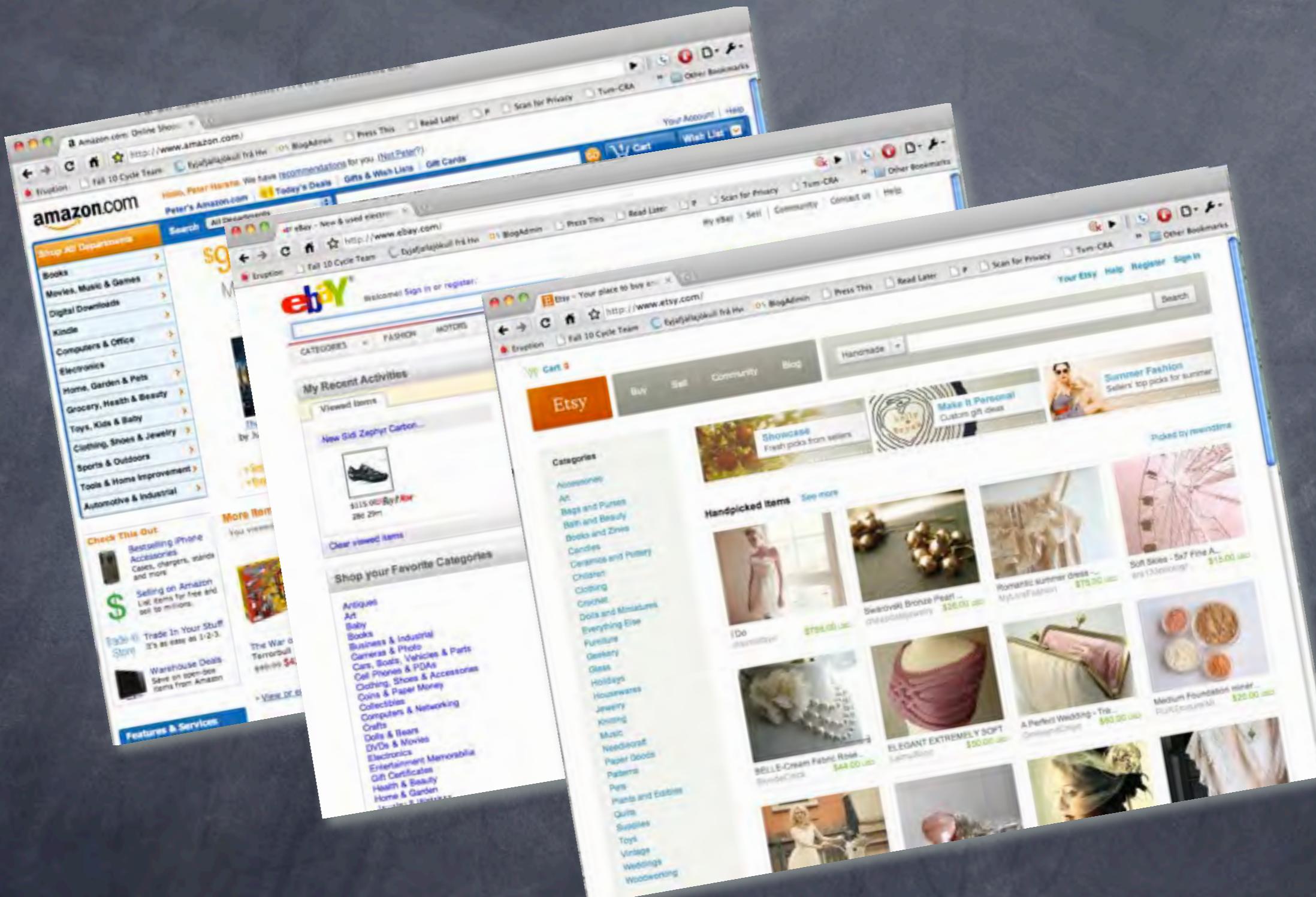
- Economic growth and job creation
- NITRD -- "inferences from enormous quantities of data"
- Achieving better health outcomes
- Moving toward a clean energy future
- Impacts of global climate change
- Improved sustainability and biodiversity
- National security
- Cybersecurity

Data analytics WPs	
Big data visioning activity	
NSF CDI	
Health IT workshop	ONC discussions
NSF/CISE SHB	NIH discussions
Multiple WPs	
NSF CRI	
NSF SEES	
Multiple WPs	

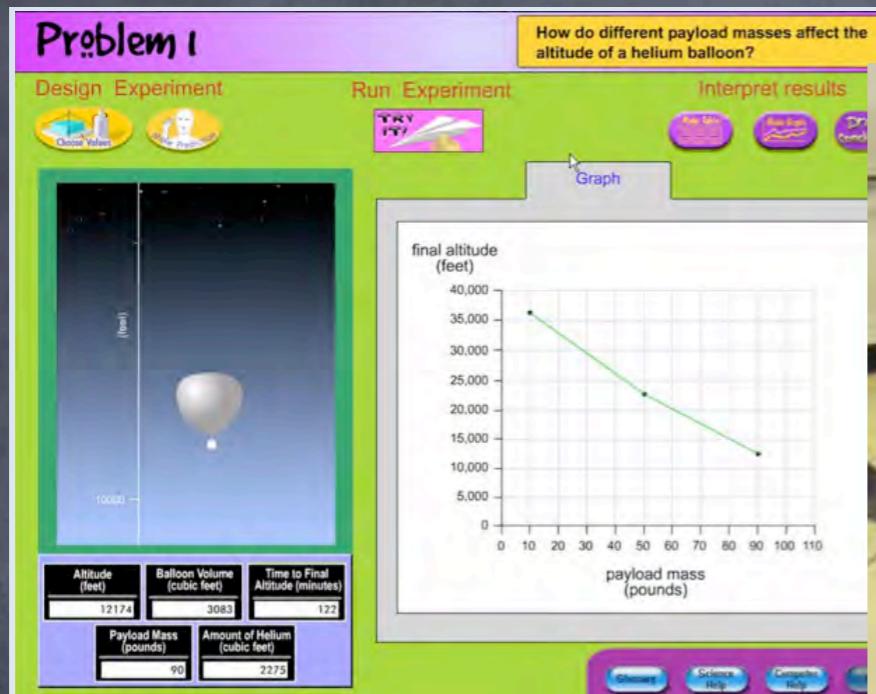


Ultimately,
basic research drives...

...how we conduct commerce...



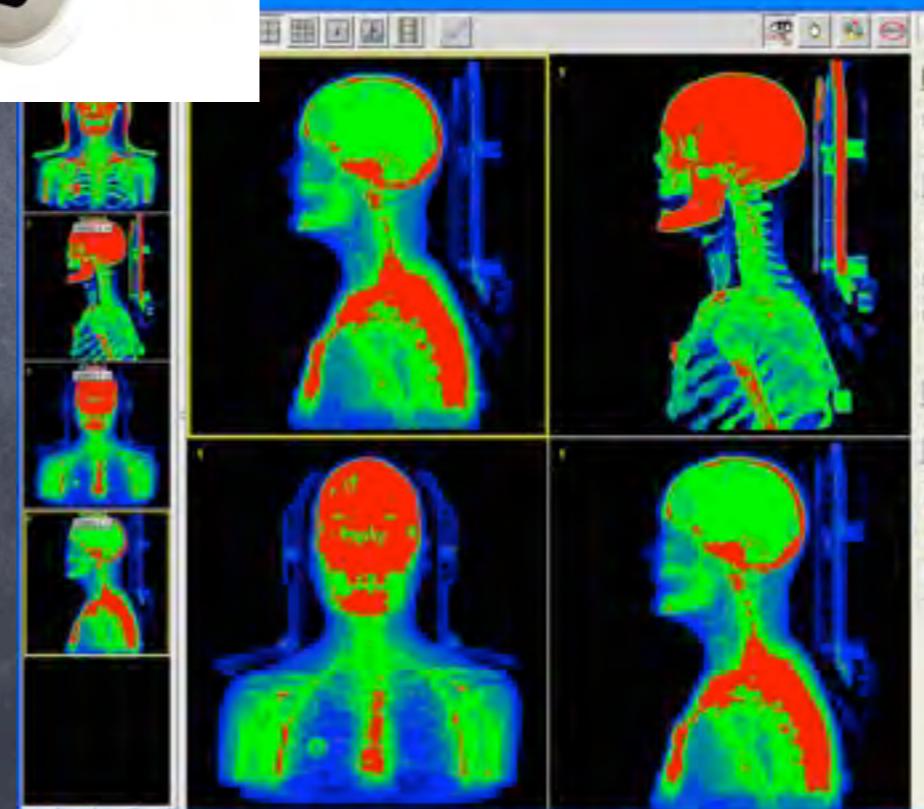
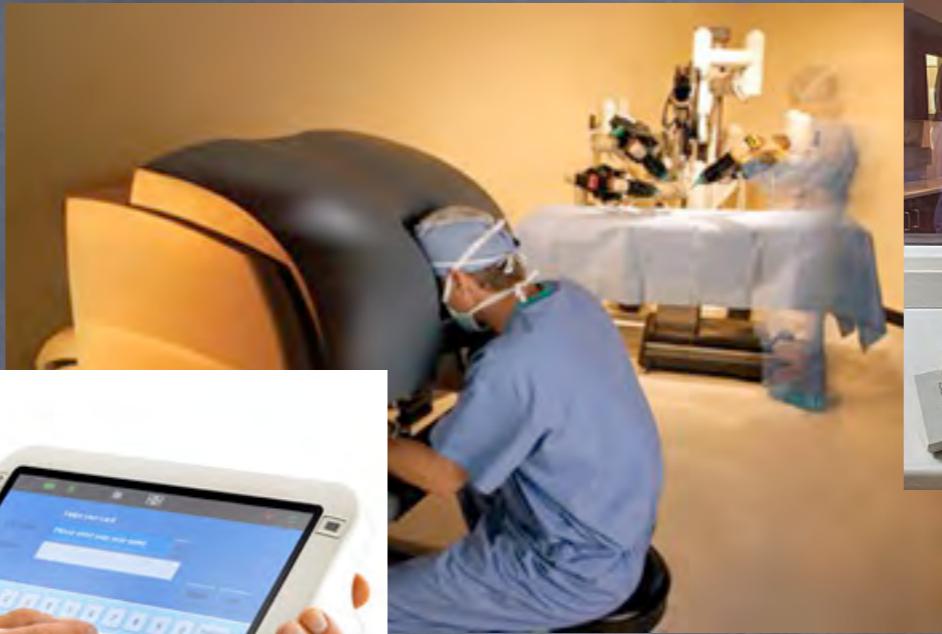
...how we learn...



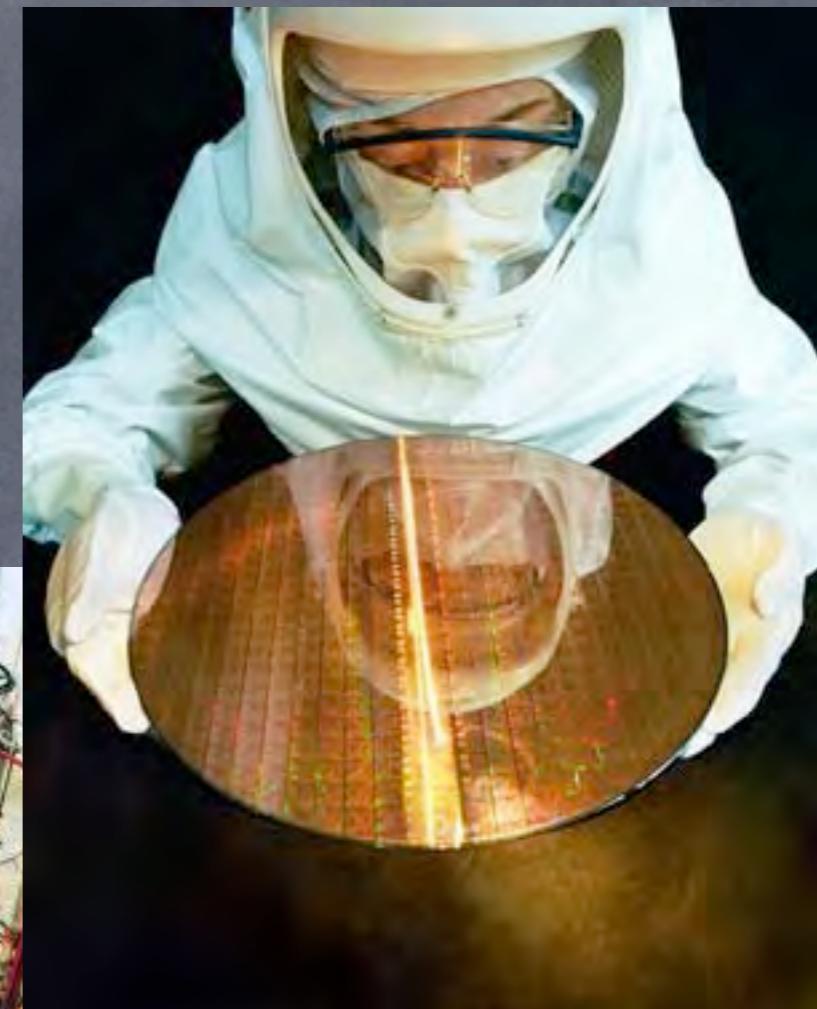
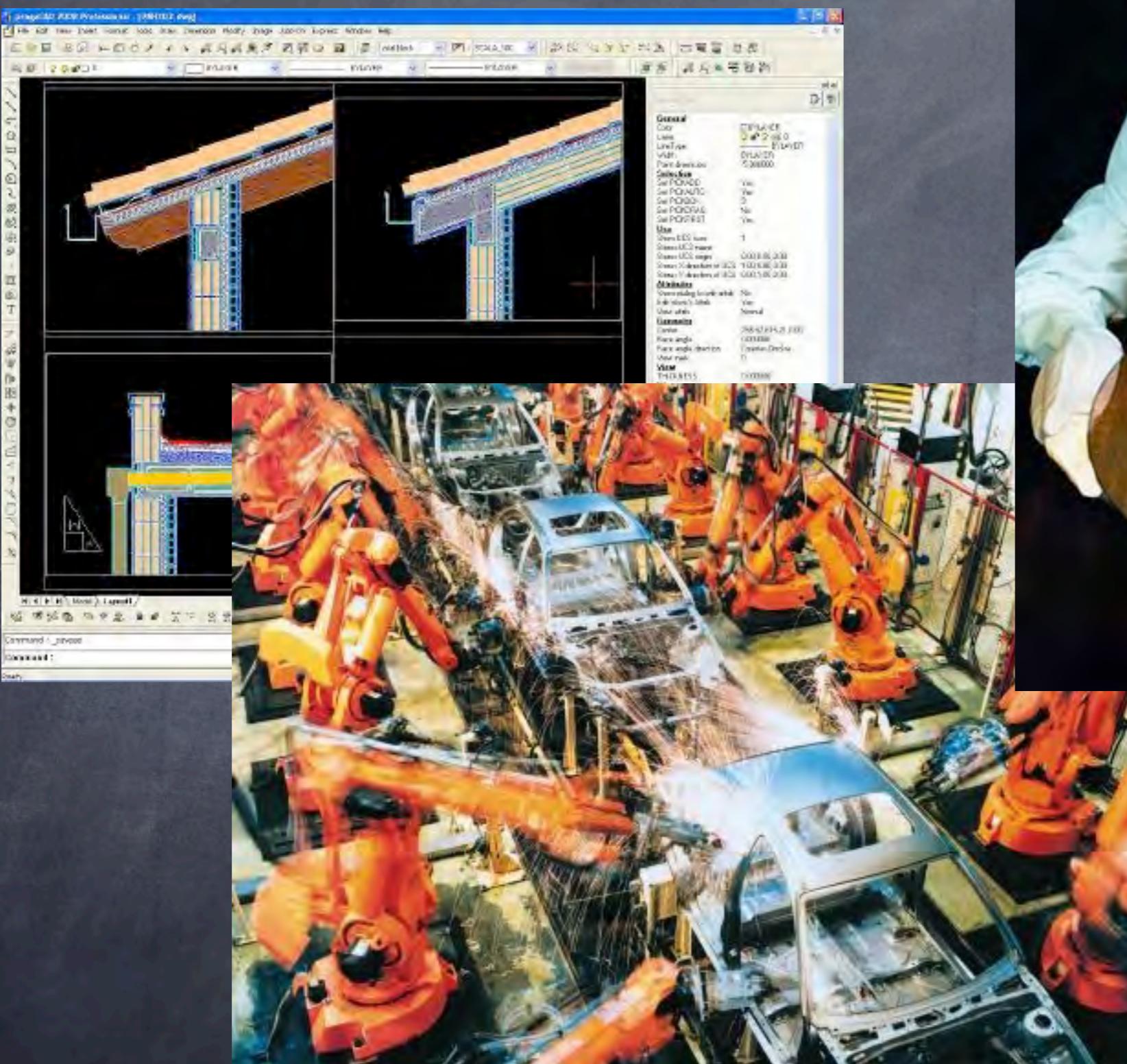


...how we work...

...how we care for ourselves...



...how we manufacture...



OSTP (whitehouseostp) on Twitter

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Astronomy tonigh
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 10pm Venus, Mars
 (2:34 PM,Jul 15)
 (2:34 PM,Jul 15)

Reminder: OSTP e Mail tomorrow: A
<http://go.usa.gov>
 8:36 AM,Jul 14
 (8:36 AM,Jul 14)

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New Democratic Senator From West Virginia Has Scant Record of Federal Campaign Contributions

Published on July 19, 2010 11:45 AM

Carte Goodwin, the 35-year-old attorney and former gubernatorial aide nominated by Democratic West Virginia Gov. Joe Manchin to temporarily fill the seat of the late Sen. Robert Byrd (D-W.Va.), may be a rising political star, but he hasn't left a long trail of federal-level campaign contributions in his wake... [\(Continue\)](#)

Bachmann Forming Tea Party Caucus, DISCLOSE Act Gets No GOP Love and More In Capital Eye Opener: July 19

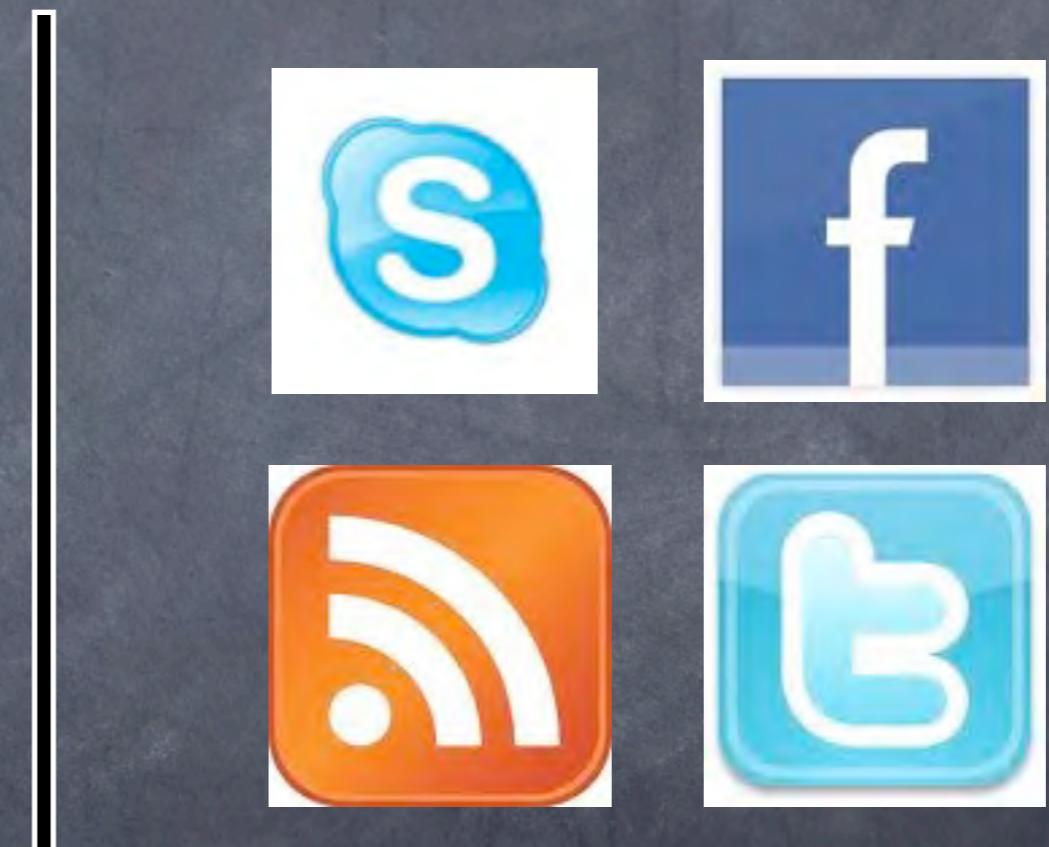
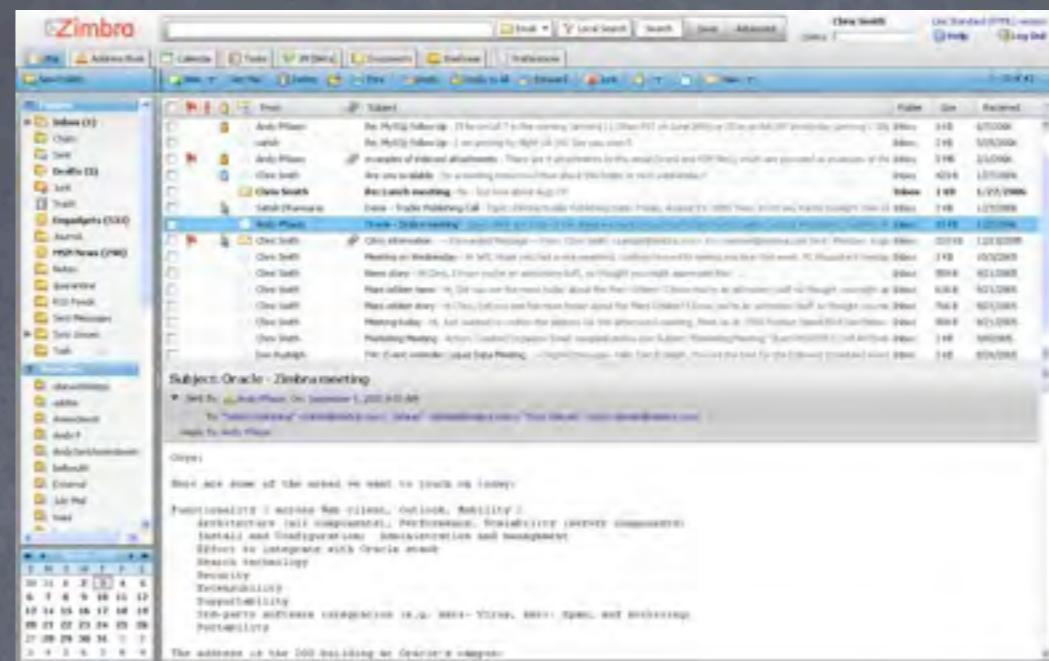
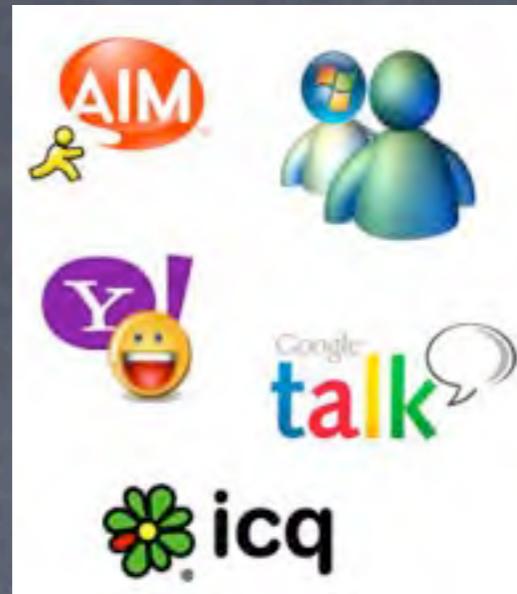
Published on July 19, 2010 10:30 AM

Rep. Michele Bachmann (R-Minn.) last week announced her intention to form a "Tea Party Caucus" in the House of Representatives, with herself as the chair. Bachmann's rising profile has bode well for her campaign coffers this year. Through June 30, she has raised more than \$4 million – including \$1.7 million between April and June alone (the most among all House incumbents and challengers)... [\(Continue\)](#)

The Blue Pages, Second Edition featuring Center for Responsive Politics data and analysis

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So we have to make a case for
Federal investment in
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- ⦿ Data analytics
 - ⦿ Overview
 - ⦿ eScience
 - ⦿ Healthcare
 - ⦿ Energy
 - ⦿ Education technology
 - ⦿ New Transportation
 - ⦿ Intelligence
 - ⦿ New Biology
 - ⦿ Robotics & emergency response

The image shows three versions of a report cover for the Computing Community Consortium (CCC). Each version has a blue header with the CCC logo and the title 'From Data to Knowledge to Action: A Global Enabler for the 21st Century'. The first version features Eric Horvitz from Microsoft Research and Tom Mitchell from Carnegie Mellon University. The second version features Randal E. Bryant from Carnegie Mellon University, Erwin P. Gianchandani from Computing Research Association, and Edward D. Lazowska from University of Washington. The third version features Chase Bittel from Computing Research Association and Erwin P. Gianchandani from Computing Research Association. The reports also mention 'Version 9: August 1, 2010'. The left side of each cover has a sidebar with text: 'Unprecedented opportunities for science and engineering are made possible by data analysis and mining', 'A new report from the Computing Research Association', 'Enabling 21st Century Discovery in Science and Engineering', 'Enabling an Initiative in "New Biology"', and 'Computing Community Consortium Version 9: August 1, 2010'.

- ⦿ Ongoing visioning activities
 - ⦿ Robotics
 - ⦿ Collective intelligence/how the brain is engineered & functions
 - ⦿ Energy
 - ⦿ Computing at the margins/global development
- ⦿ ...

Last but not least...

...A call to service

- ⦿ There's value to serving as a program officer
 - ⦿ Some fields view this role in higher regard than others
- ⦿ Learning how DC works can make us better scientists, researchers, and educators
 - ⦿ We know what to propose and how to propose it
 - ⦿ We know the skills set required of our graduates
- ⦿ We must make sure there's a constant stream of people heading to DC -- they become "advocates" for the field
- ⦿ Stay involved -- even if you can't make it to DC

Questions?

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