

Computing Research Association



Snowbird 2004

The State of Computing Research

The State of CRA

Snowbird 2004

Jim Foley, CRA Chair
Andy Bernat, CRA Executive Director

Good News – we Have a Great Story to Tell

- Computing maps directly onto national priorities
 - Health
 - Defense / Homeland Security
 - Economic strength & competitiveness
- Two-thirds of productivity gains since 1995 due to IT
 - “Information Technology has been the distinguishing feature of this pivotal period in American economic history” – Alan Greenspan

The Computing Research Story

- Significant economic activity in Computer and Communications segment
 - All based on results of long-term Federally-funded computing research
 - Significant contributions to balance of payments

The Computing Research Story

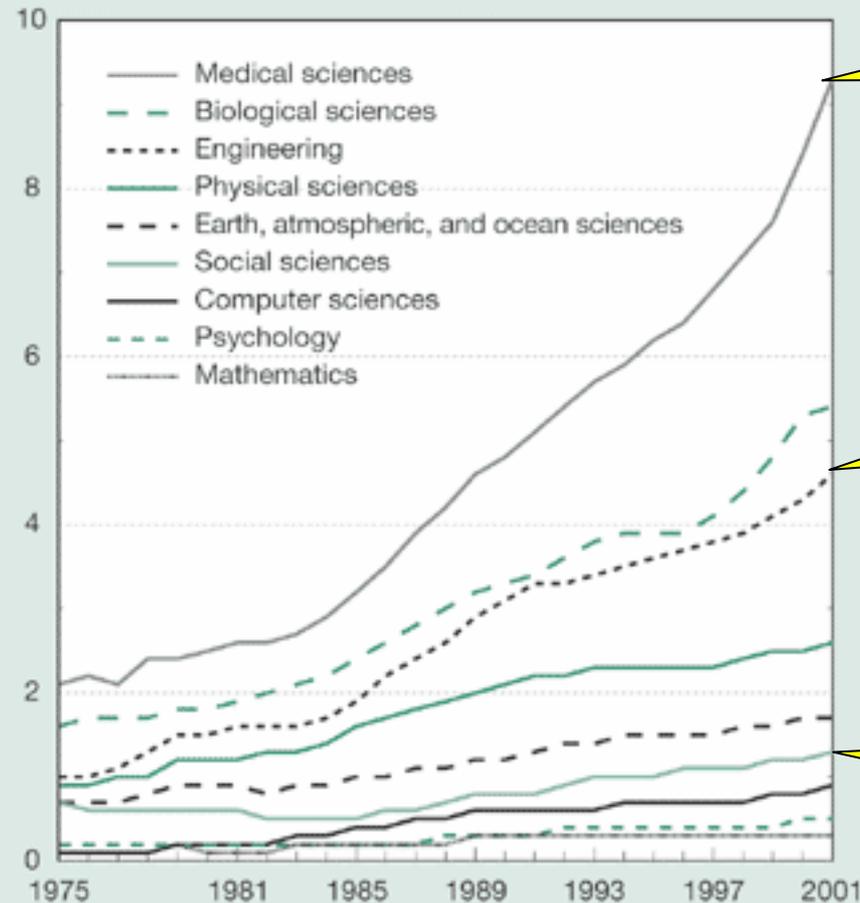
- Computing is improving our lives
- Computing has changed the conduct of scientific research
- Demand for IT professionals projected strong for next 10 years

Good News – Overall Research Funding is Increasing

- Bad News – CS & Engineering not keeping up

Academic R&D expenditures, by field: 1975–2001

Billions of constant 1996 U.S. dollars



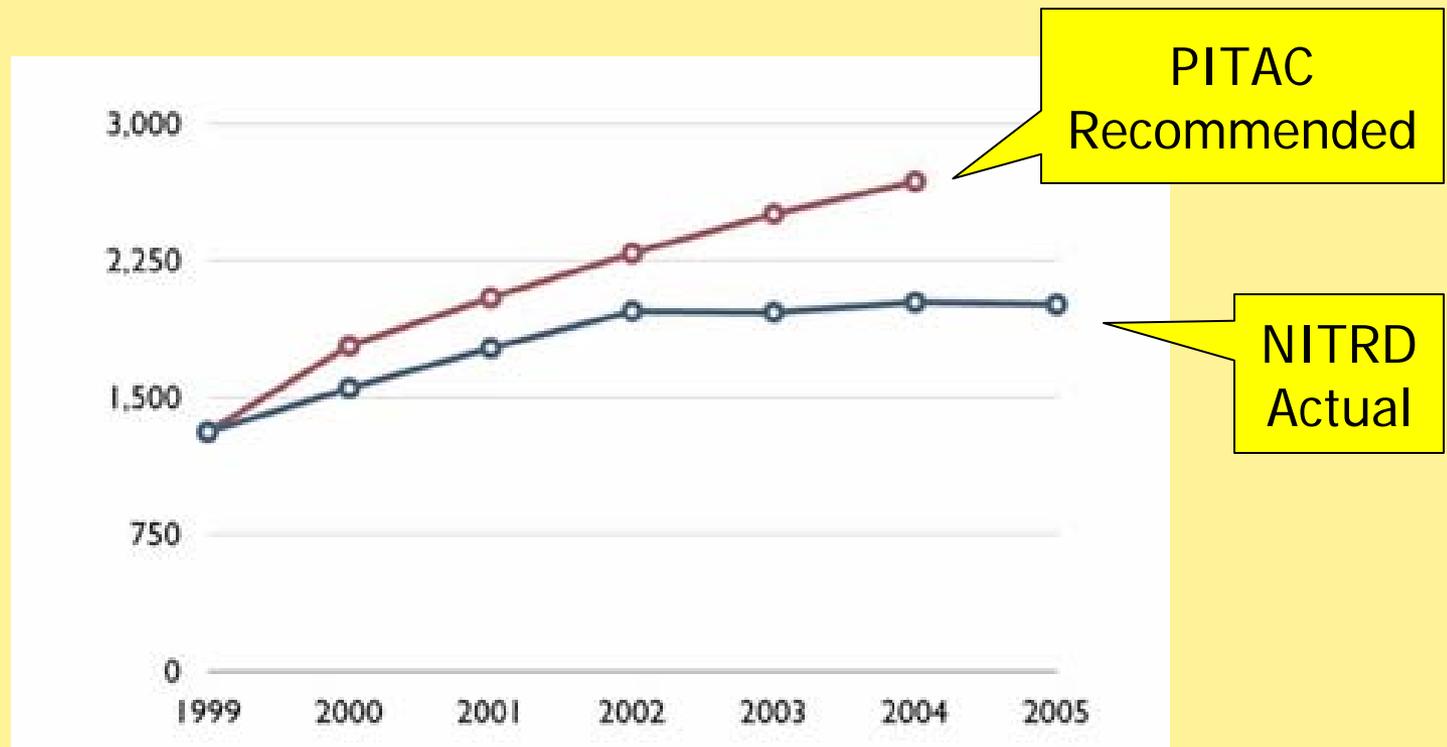
Medical

Engr.

CS

More Bad News

- Computing Research not even being funded at PITAC-recommended levels



More Bad News – NITR&D Funding Decreasing

	FY04	FY05	% Change
NSF	\$754	\$761	1%
NIH	\$368	\$371	1%
DOE	\$344	\$354	3%
NASA	\$275	\$259	-6%
DOD	\$252	\$226	-10%
NIST, NOAA	\$26	\$33	27%
EPA	\$4	\$4	0%
TOTALS	\$2,023	\$2,008	-1%

Funding Expectations Flat

- “We” may have to make do with less
 - There are more of “us” each year
- Especially hard on new faculty
 - Overall NSF acceptance rates in 25-27% range
 - CISE typically 5-10%, sometimes lower

Good News - CISE Staff Increase

- At last!
- 8-10 program director positions to fill
- Plus two Division Director openings

Good News

- PITAC back in business
 - 5 CRA present/past board members
 - Lazowska (co-chair), Bajcsy, Patterson, Reed, Spafford
- Topics
 - Cyber Security
 - Health and IT
 - Computational Science

CRA – SPEAK WITH ONE VOICE FOR COMPUTING RESEARCH COMMUNITY

- The case for computing research
- The case for graduate school
- Advocacy and testimony on the Hill
- Information collection and dissemination

Good News

- Computing is Everywhere
- (No Bad news here :)

CRA Role

- Engage the broader Computing Research community
 - IT Deans
 - ECEDHA
 -
- CS Dept Chairs - Please reach out to your Comp Engr Depts.

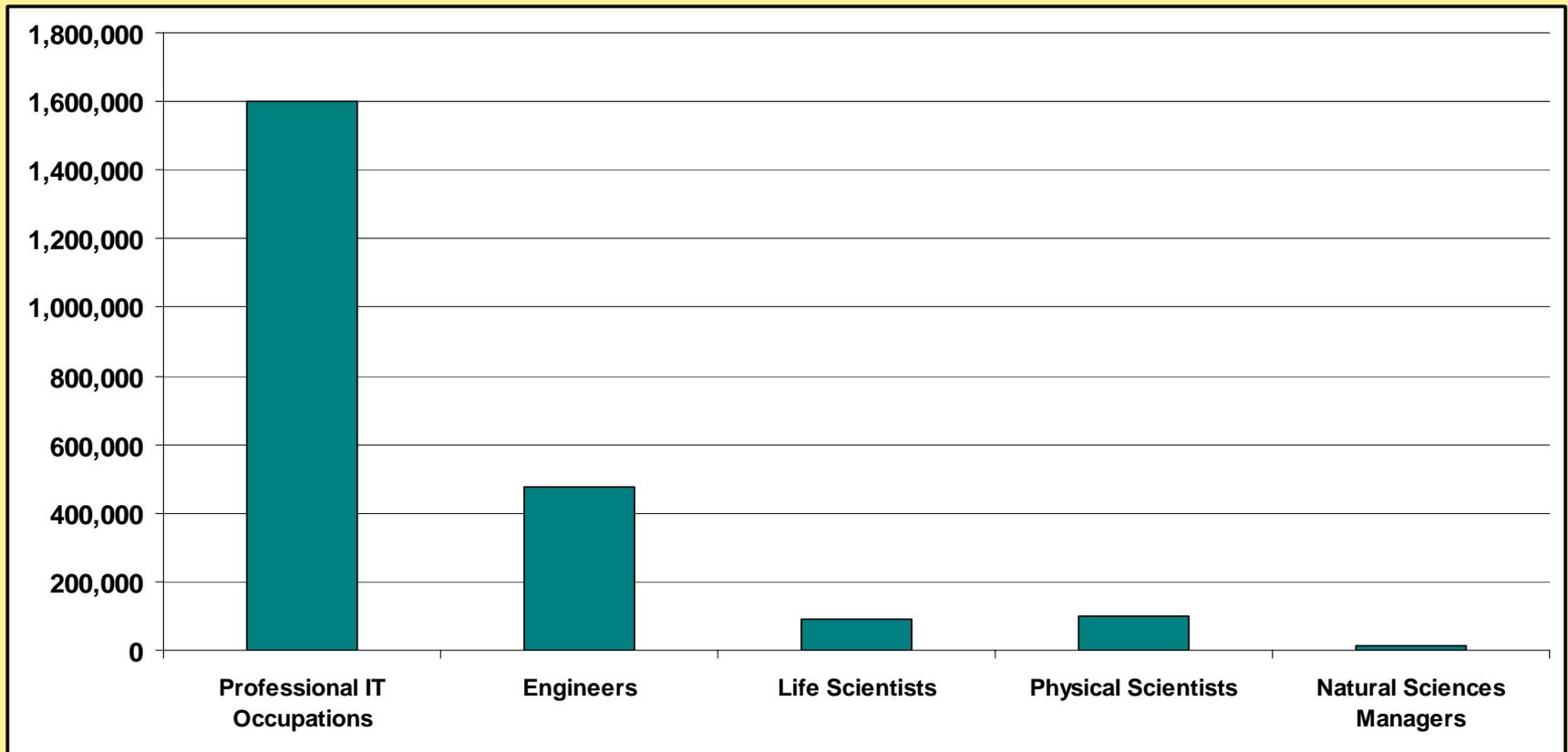
Instant Survey

- How many of you are from academic units that have more than “Computer Science” in title?
 - (About half of the academics raised their hands)

CRA Role

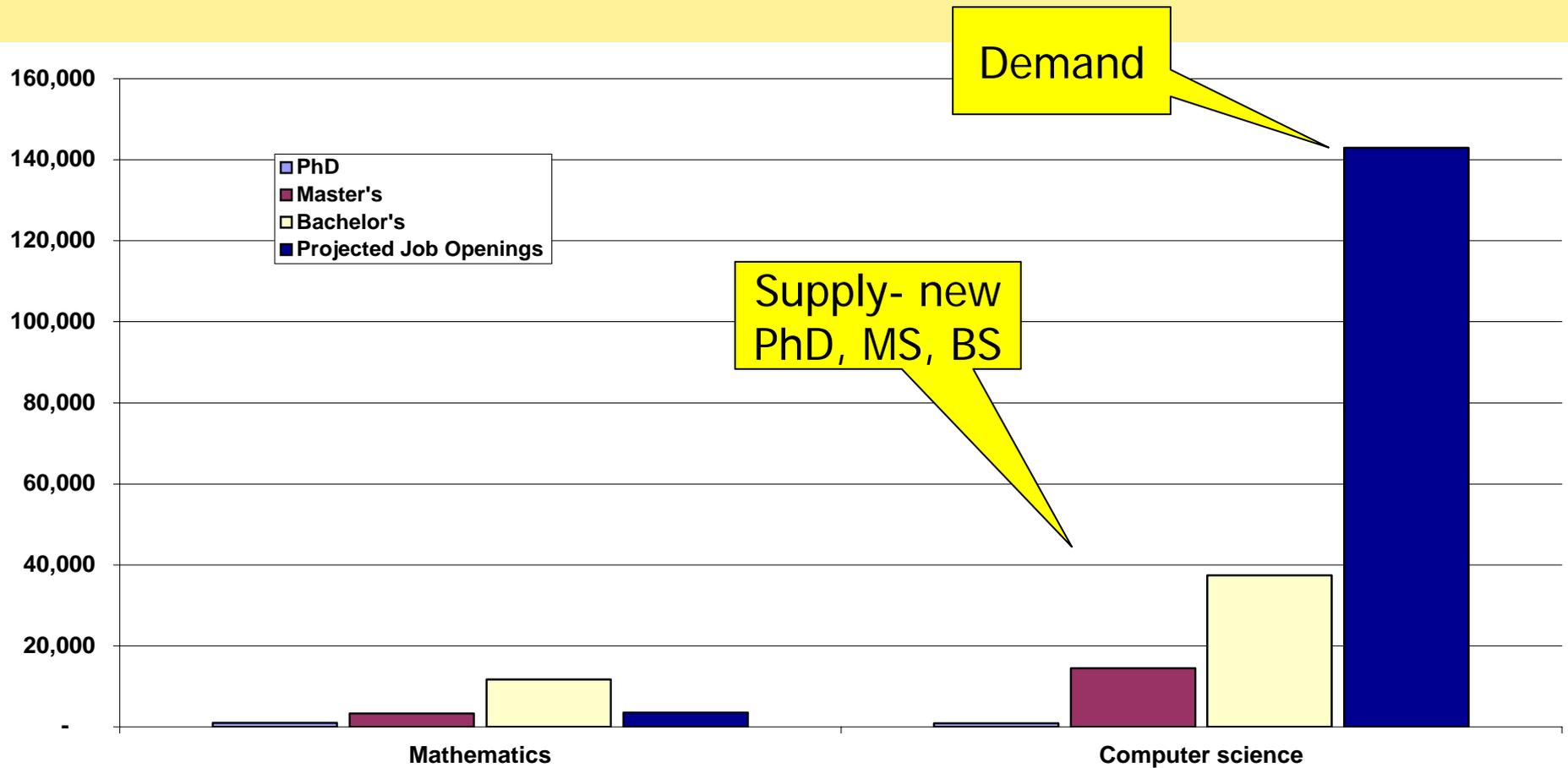
- Help define the new world of Computing Research
 - Interdisciplinary
 - Use-motivated
- **SPEAK WITH ONE VOICE**

Good News - Projected Demand for IT Professionals



Total IT Job Openings 2002 to 2112 – New jobs plus replacements due to retirements - BLS

Bad News? Demand > Supply?

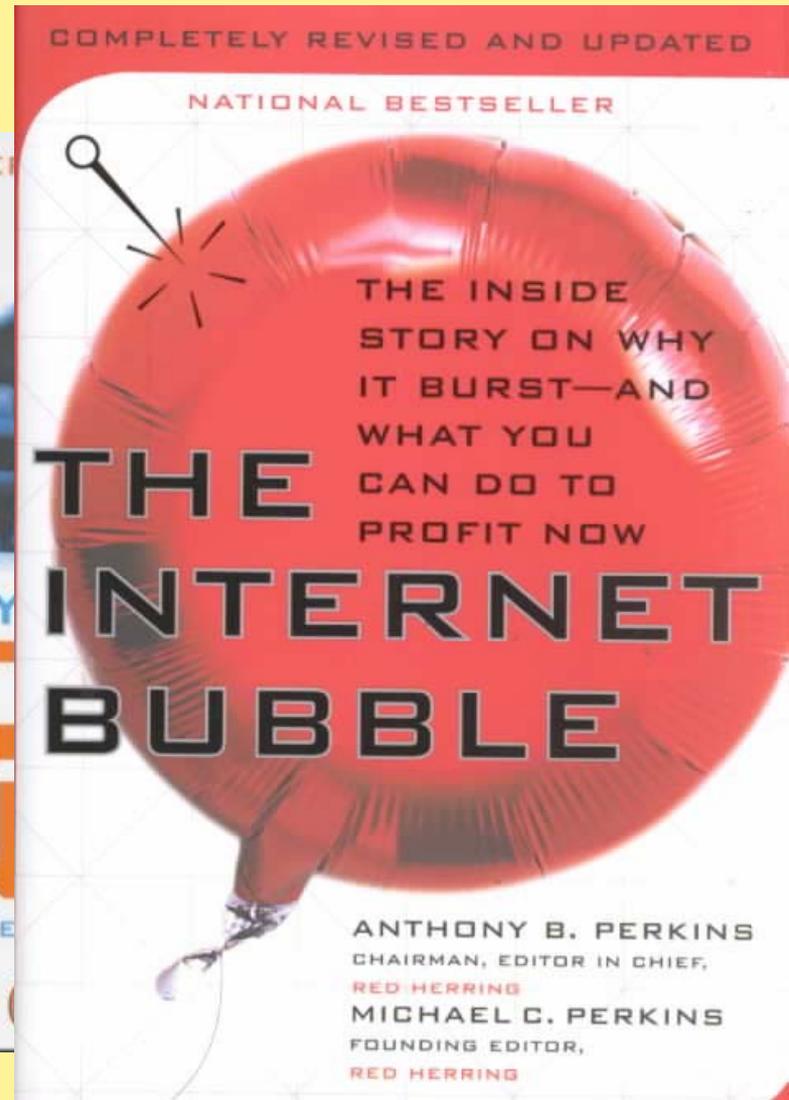
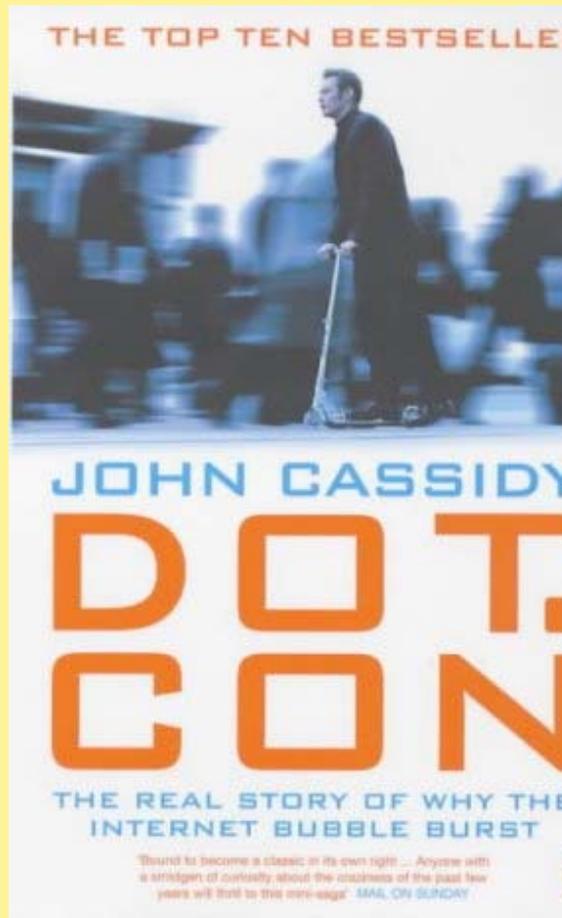


Yearly demand and supply of new grads; **unemployed workers not included**. Source: Bureau of Labor Statistics

Bad News – A “Triple Whammy”

Bad News – A “Triple Whammy”

First the
Dot-Com
Bust



Then 9/11



Then Off-Shoring

The Economist

Time to ditch Cheney?
PAGE 34

Germany's declining economy
PAGES 13 AND 75

Big takeovers are back
PAGES 14 AND 67-69

A SURVEY OF INDIA
AFTER PAGE 52

FEBRUARY 21ST-27TH 2004 www.economist.com

IRAQ: THE STAKES FOR THE ECONOMY—AND BUSH

The McGraw-Hill Companies

BusinessWeek

FEBRUARY 5, 2003 WWW.BUSINESSWEEK.COM

The new job



FOLLEY JAMES D
1588 FRANK TUCK RD NE
ATLANTA GA 30309-2610
9889 P141
JUL 09 05 001
#3MC1588F091 9A360696
9L 3711
#BXBCXN *****NR-RT LOTMC-008

The McGraw-Hill Companies

BusinessWeek

MARCH 1, 2004 www.businessweek.com

ENRON
THE CASE AGAINST JEFF SKILLING (P.32)

WIRELESS
HOW THE CINGULAR DEAL HELPS VERIZON (P.36)

DIVIDENDS
THE RUSH TO RAISE PAYOUTS (P.96)

FORD
LESSONS FROM VOLVO AND JAGUAR (P.116)

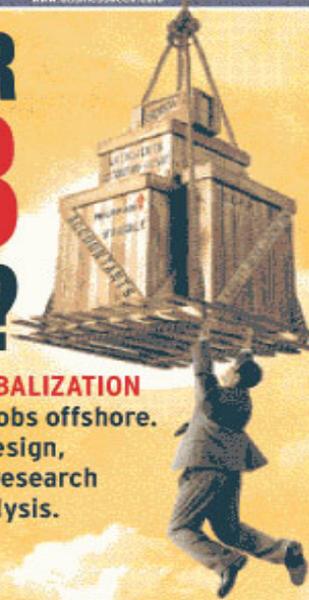
COCA-COLA
MOVING AWAY FROM

SOFTWARE

Will outsourcing hurt America's supremacy?

BEST BOND FUNDS
OUR ANNUAL SCOREBOARD

IS YOUR JOB NEXT?



A new round of **GLOBALIZATION** is sending upscale jobs offshore. They include chip design, engineering, basic research—even financial analysis. Can America lose these jobs and still prosper?

A Word on Off-Shoring: Causes

1. Technology – successes of computer science and computer engineering!

The “Death of Distance”

If it can be bits, it’s up for grabs

No Neo-Luddites out there

2. Economics – business realities

Off-Shoring Economics - 5Cs

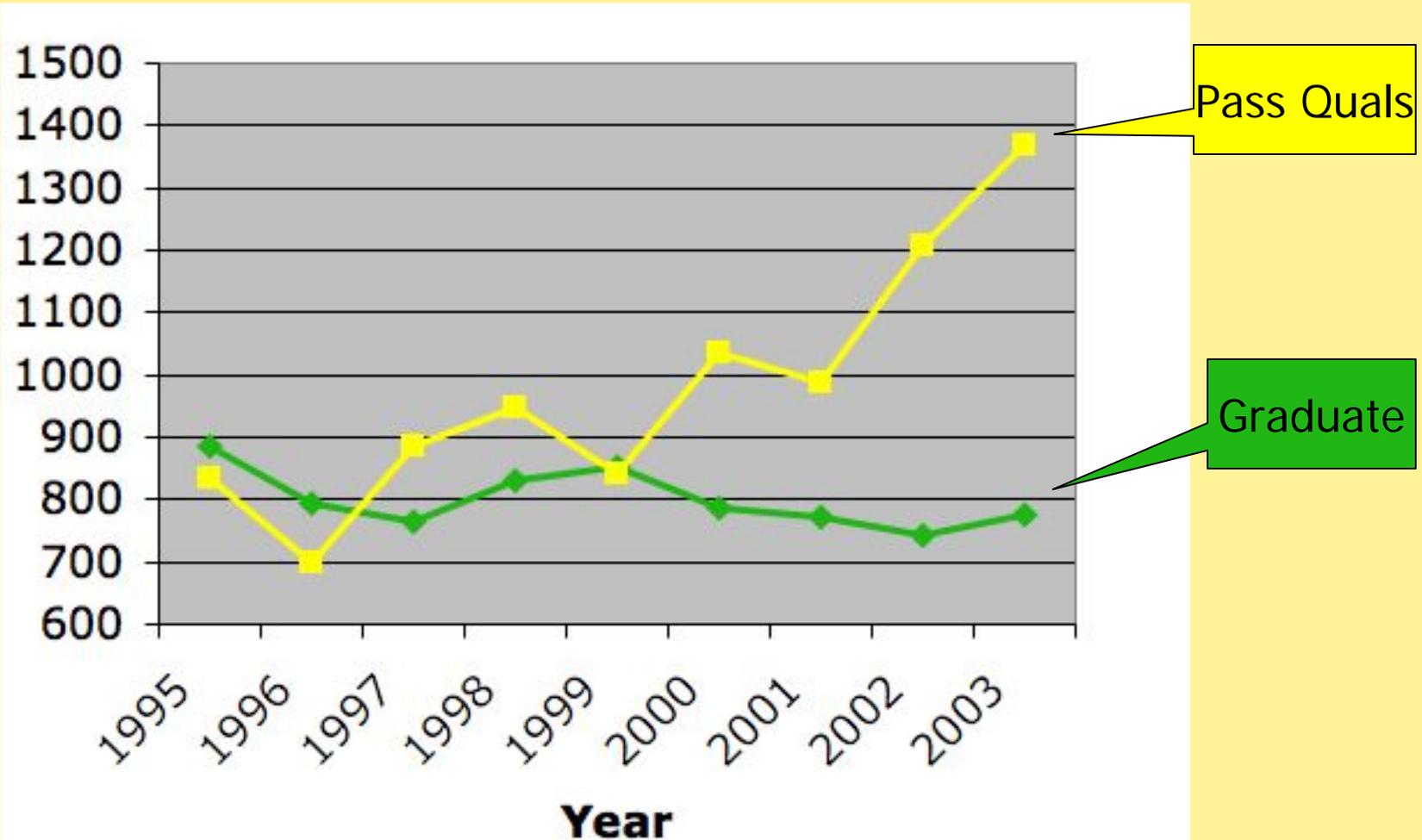
- Closer to market
- Closer to suppliers
- Closer to talent
- Closer to politicians - to do business
- Cost reduction - just one of many considerations
 - Labor
 - Infrastructure
 - Taxes and regulations
 - Government subsidies

Triple Whammy has Driven Down UG Enrollments

- Undergraduate – perceived low demand
 - Newly-declared CS/CE undergrads in 2003
 - Down 22% to 18,000 (2003 Taulbee)
 - A strong trend
- *Which in turn can affect our financial viability*

Good News – PhD Production

Finally Trending Back Up



CRA Role

- Data - Taulbee Survey
- Pipeline
 - CRA-W
 - Support Coalition to Diversify Computing
- Support changes to Visa process
- Much needed beyond what CRA can do -
High School and earlier

Triple Whammy + Other Factors => Positive Impacts on Universities

- Re-examine what we teach in CS/IT
 - Connect computing with X
 - X = people, biology, science, business, etc.
 - Two of the PITAC topics do this
 - Health and IT, Computational Science
 - Computing and IT \supset Computer Science
 - “Customer Facing” knowledge and skills

Warren Washington - Chair, NSB

"Academic institutions need to change to educate students in a much broader context than they do now. You'll be hearing enlightened university presidents talking about this. But down at the department level, there's this focusing only on the narrow sort of discipline objectives. That's where it's going to be hard to make changes."

Quoted in the Chronicle of Higher Education

An Inflection Point for Computing?

- Opportunity to really examine Computing Education and Research
- “TripleWhammy” gave us breathing space and motivation
- Potential Crises in Funding and Pipeline
- Self-examination of what is computing

So What Can CRA Do About
This New World?

CRA Role – New Activity

- Pipeline
 - The case for grad school
 - Why strong BS students don't go to grad school
- Improving graduate education
 - Best practices
 - Courses beyond computing - broadening
- If we stand still, we will fall behind
- Interested? Talk to Jack Stankovic

CRA – New Activity

- PhD opportunities beyond professoriate and research labs
- Interested? Talk to Marc Snir

CRA – New Activity

- Computing Research is increasingly interdisciplinary
- Faculty are increasingly interdisciplinary
- Need best practices in evaluating interdisciplinary faculty?
- Interested? Talk to Dan Reed

CRA as Catalyst

- Leadership Summit Tomorrow
 - AAAI, ACM, CACS/AIC, CRA, CSTB
 - IEEE-CS, NSF, PITAC, SIAM, USENIX
- Strategies / cooperation on
 - Defining Computing & Computing Education
 - Sharpening and Delivering the Computing Message
 - The Case for Computing as an Undergrad Major/Minor
 - The Case for Graduate School
 - The Case for Computing Research Funding

More Generally

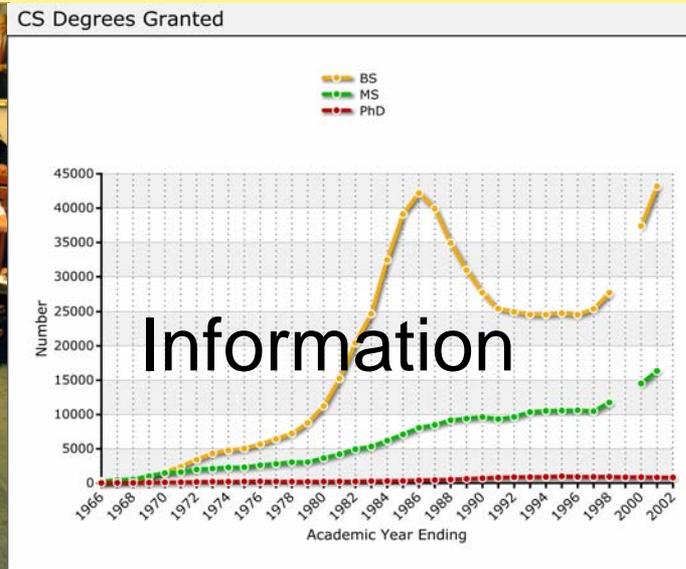
- Time for broader community involvement in CRA
 - CRA-W and Snowbird already there
- Participate in existing committees
- Participate in new activities
- Chairs – please identify
 - Promising Associate Professor
 - Seasoned Full Professor

CRA Finances are Strong



- Growing membership
- Stable revenue
- Sufficient reserves

CRA Does



CRA Mission Areas

<p style="text-align: center;">Policy</p> <p>IT Research Funding and Research Environment Tracking Budgets Educating Members on Advocacy CRAN (advocacy network) Testimony Submissions to Congressional Committees Policy Reports Workforce Policy Issues Related to Women and Minorities News Conferences Congressional Visits Publications Policy Blog Website</p>	<p style="text-align: center;">Information Gathering and Dissemination</p> <p>Computing Research News (<i>CRN</i>) Computing Research Bulletin Surveys—Taubee, Profiles, Lab Salaries CRA Best Practices Reports Forsythe List/Address Labels CRA-W Careers Booklet CRA-W Graduate School Information Guide Publications Brochures Annual Reports Websites—CRA, CRA-W, CDC Conferences, Workshops</p>
<p style="text-align: center;">Human Resources</p> <p>Job Service Workforce Issues Academic Careers Workshop CRA-W Support CRA-W/Lucent Distinguished Lecture Series CRA-W Distributed Mentor Project CRA-W Career Mentoring Workshops CRA-W Collaborative Research Experiences for Undergraduates (CREU) CRA-W Grad Cohort Program CRA-W Cohort for Associate Professors Project CRA-W Recruitment and Retention Report Recruitment and Retention of Women in CS&E Graduate Programs Study CRA-W "Expanding the Pipeline" Column in <i>CRN</i> CDC Support CDC Recruitment and Retention Report Sessions at Snowbird CDC Tapia Conference Outstanding Undergraduate Awards A. Nico Habermann Award CRA-W Anita Borg Early Career Award</p>	<p style="text-align: center;">Community Building</p> <p>CRA Conference at Snowbird (biennial) Computing Leadership Summit Lab Directors Regional Meetings IT Deans Meetings CRA Membership Activities Distinguished Service Award External Awards Industry-University Relations Industry-University Model Agreements Grand Challenges Conference CRA-W/Lucent Technologies Distinguished Lectures Conferences, Workshops</p>

CRA Does Computing Research Policy

The blog

The screenshot shows a web browser window with the address bar containing `http://www.cra.org/govaffairs/blog/index.php`. The browser's navigation bar includes a search field with the Google logo and a dropdown menu with items like 'morning', 'blog', 'Macintosh', 'Organizations', 'Machining', 'Railroads', 'Software', and 'SCUBA'. The website header features the CRA logo (Computing Research Association) and the title 'Computing Research Policy Blog' with the subtitle 'Advocacy and Policy Analysis for the Computing Research Community'. A horizontal navigation menu contains links for 'Advocacy', 'CRAN', 'Policy Issues', 'Budget', 'Congress', 'Executive Branch', and 'Archives'. On the left side, there is a vertical menu with links such as 'Awards', 'Events', 'Gov't Affairs', 'Information', 'Jobs', 'Committees', 'People', 'Publications', 'What's New', and 'Home'. Below this is a search box with the text 'SEARCH this site:' and a 'Search' button. Further down is an 'ARCHIVES' section with a list of months from June 2004 to January 2004, and a 'RECENT ENTRIES' section with a list of article titles. The main content area is dated 'JUNE 23, 2004' and contains two articles. The first article is titled 'SCI COM TO HOLD E-VOTING HEARING THURSDAY' and discusses a hearing on testing and certification for voting equipment. The second article is titled 'PICS FROM THE CNSF SCIENCE EXHIBITION ON CAPITOL HILL' and describes CRA's participation in a science exhibition. The text of the second article is partially cut off at the bottom of the screenshot.

Computing Research Policy Blog

http://www.cra.org/govaffairs/blog/index.php

morning ▾ blog Macintosh ▾ Organizations ▾ Machining ▾ Railroads ▾ Software ▾ SCUBA ▾

Computing Research Policy...

 **Computing Research Policy Blog**
Advocacy and Policy Analysis for the Computing Research Community

Advocacy CRAN Policy Issues Budget Congress Executive Branch Archives

JUNE 23, 2004

SCI COM TO HOLD E-VOTING HEARING THURSDAY

The House Science Committee will hold [a hearing](#) on testing and certification for voting equipment. Here's an early version of the [hearing charter](#).

Posted by PeterHarsha at [08:16 PM](#) | [TrackBack \(0\)](#)

PICS FROM THE CNSF SCIENCE EXHIBITION ON CAPITOL HILL

CRA joined 31 other scientific societies and universities yesterday in showing off the results of NSF-sponsored research at the 10th annual [Coalition for National Science Funding](#) Science Exhibition and Reception on Capitol Hill. CRA was ably represented at the event by [DK Panda](#) and his students (Jiuxing Liu, Pavan Balaji, Ranjit Noronha, and Sayantan Sur) from [The Ohio State University](#), who presented work on software that allows high performance, scalable communication using the InfiniBand networking technology.

The Exhibition was a great opportunity for making the general case for federal support of basic research, especially at NSF. This year's event was widely-attended. Many key congressional staffers, influential Members of Congress, and important members of the Administration and NSF took time out of their schedules to see the exhibits. Here's the proof! (click for larger images)

 The CRA booth. Underneath the table were four

Awards
Events
Gov't Affairs
Information
Jobs
Committees
People
Publications
What's New
Home

SEARCH
Search this site:

ARCHIVES
June 2004
May 2004
April 2004
March 2004
February 2004
January 2004

RECENT ENTRIES
Sci Com to hold E-voting Hearing Thursday
Pics from the CNSF Science Exhibition on Capitol Hill
Senate Hearing on High End Computing at DOE
DMCA Reform Gathering Momentum?
Latest PITAC Highlights

When CRA Talks, People Listen



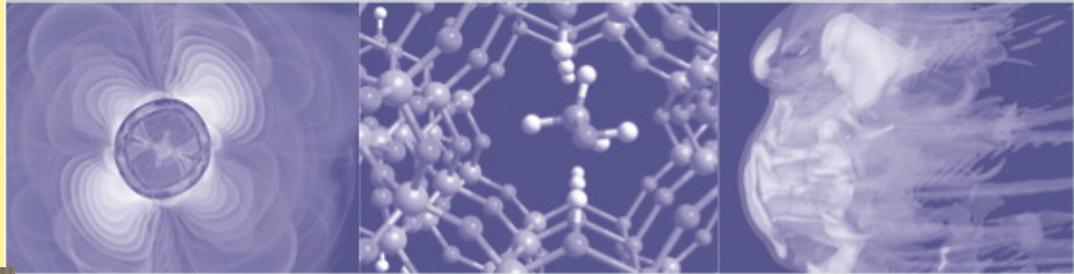
Dr. William Scherlis
George Mason University

Dr. Stephen Squires
Washington State University

CRA
Organizes
Workshops
that
Drive Policy

Workshop on

The Roadmap for the Revitalization of High-End Computing



COMPUTING RESEARCH ASSOCIATION

June 16-18, 2003

Edited by Daniel A. Reed





Everyone
gets advice
from



CRA Does Computing Research Information

Table 1. Base Salaries in Industrial Research Labs by Years of Post-Ph.D. Experience (thousands of dollars)

	2001		2002	
	Median	Mean	Median	Mean
New PhD	97.5	98.8	99.7	99.5
1-5 Years	105.2	107.1	110.4	112.9
6-10 Years	124.3	126.3	129.9	132.2
11-15 Years	134.2	134.3	140.8	141.7
16+ Years	138.0	139.3	147.1	147.5

Table 2. Total Cash Compensation* by Years of Post-Ph.D. Experience (thousands of dollars)

	2001		2002	
	Median	Mean	Median	Mean
New PhD	105.7	107.1	105.7	103.2
1-5 Years	113.1	114.9	117.1	120.6
6-10 Years	133.6	136.5	139.8	143.6
11-15 Years	143.7	145.0	151.1	152.8
16+ Years	147.2	150.2	157.3	159.0

* Total Cash Compensation is base salary plus additional cash (e.g., bonus) items.

Figure 6. BS Production

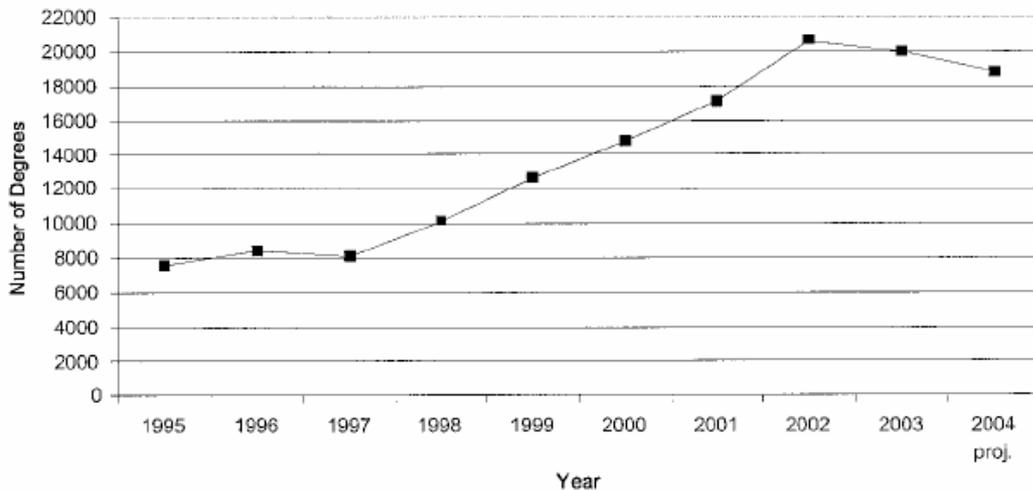


Figure 3. PhD Pipeline Corrected for Year of Entry

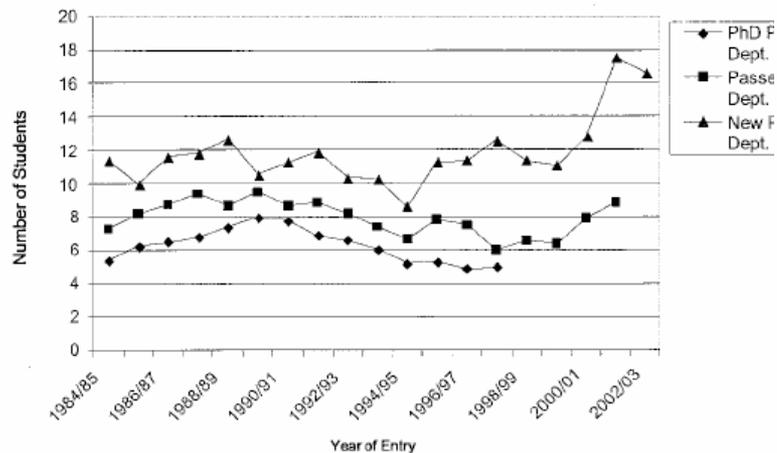
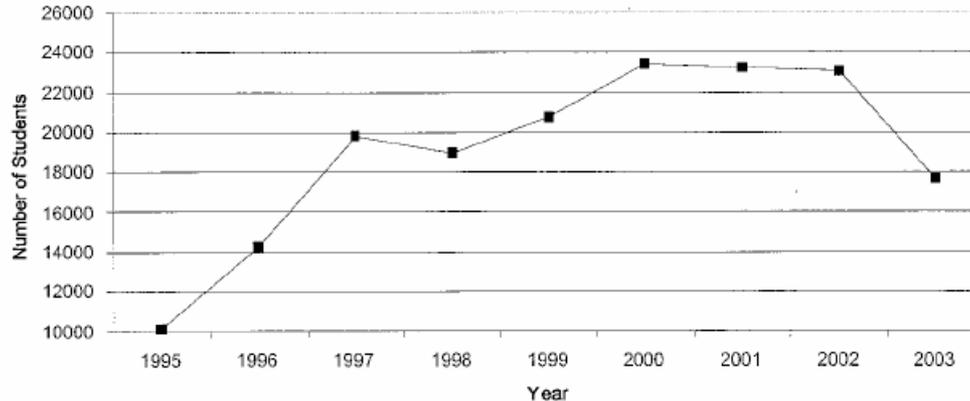


Figure 7. Newly Declared CS/CE Undergraduate Majors



COMPUTING RESEARCH NEWS

A Publication of the Computing Research Association

May 2004

Vol. 16/No. 3

An Overview of Past and Projected Employment Changes in the Professional IT Occupations

By John Sargent



U.S. Department of
Commerce

Professional information technology (IT) occupations have experienced both rapid growth and, most recently, higher-than-average job losses.

Professional IT occupations provided the lion's share of science and engineering job growth during the period 1991-2001. Computer system analysts and scientists and computer programmers together accounted for 79.4 percent of job growth in the science and engineering occupations during this period; if one also adds electrical/electronic engineers (many of whom are IT professionals), the total rises to 93.1

and indirectly—and their importance to U.S. competitiveness, economic growth, and innovation, policymakers have focused attention on understanding this key labor market and the challenges associated with both rapid job growth and recent job losses in these occupations.

Accordingly, since the mid-1990s the U.S. Department of Commerce's Office of Technology Policy (OTP) has conducted extensive analysis of the characteristics of the IT workforce, the dynamics of the IT labor market, the IT education and training landscape, and potential policy implications.² This article presents an overview of OTP's analysis of IT occupational employment changes between 1990 and 2002, as well as OTP's analysis of the Department of Labor's Bureau of Labor Statistics' (BLS) projections for IT occupational growth through 2012. IT

Population Survey (CPS), a product of the U.S. Department of Commerce's Census Bureau and BLS, and 2) the Occupational Employment Statistics (OES) survey, a BLS product.

These surveys used separate and distinct occupational classifications. In addition, the survey methodologies differ significantly; for example, CPS data are acquired through a survey of households, while OES data are derived from a survey of companies. As a result, the CPS and OES surveys arrive at different aggregate numbers for the IT workforce and thus are not directly comparable. Still, both surveys provide insight into the dynamics of the labor market for professional IT workers.

A Decade of Strong Employment Growth

Rapid advances in digital technologies and their widespread deployment throughout the economy fueled explosive growth in the demand for workers skilled in the development and use of information technology. Between 1990 and 2000, CPS data show that the number of jobs in professional-level IT occupations doubled, expanding from 1.2 million to 2.5 million. This translates into an annual growth rate³ of 7.2 percent for these IT occupations, compared with 1.3 percent for all occupations during the same period.

Recent Losses in IT Occupational Employment

The IT occupational employment picture has been quite different since 2000. Between 2000 and 2002, OES

SNOWBIRD 2004



CRA Bulletin

June 3, 2004

- [NSF Funding Outlook Grim But Cyberinfrastructure is a Priority](#)
- [Highlights from the House Science Committee HPC Hearing](#)
- [President Awards CRA-W for Mentoring Efforts](#)
- [Industrial R&D Expenditures Declined in 2002](#)
- [Academic R&D Grows in 2002](#)
- [Academies' Presidents Comment on U.S. Visa Policies](#)
- [CREU Program Accepting Applications](#)
- [Fulbright Scholar Awards 2004-05](#)

[About CRA](#)

[CRA For...](#)

- [Faculty](#)
- [Students](#)

[Events](#)

<< [Back to CRA Bulletin home page](#)

[Jobs](#)

<< [Previous Bulletin \(April 27, 2004\)](#)

[Gov't Affairs](#)

NSF Funding Outlook Grim But Cyberinfrastructure is a Priority, says NSF Director

National Science Foundation Director Arden Bement met recently with the Coalition for National Science Funding (of which CRA is a member) and warned the science community CNSF represents to lower expectations of increased funding for the agency in the near-term, saying the expectation of budget-doubling, as authorized by Congress and the President in 2002, "isn't reasonable."

For more information: <http://www.cra.org/govaffairs/blog/archives/000084.html>.

[Data &](#)

[Resources](#)

Highlights from the House Science Committee HPC Hearing

In what could fairly be described as a "love in," the recent House Science Committee hearing on HR 4218, the High Performance Computing Revitalization Act of 2004 (HPCRA), featured witnesses from the Administration, industry, university and federal labs all singing the praises of the committee's bill to amend the 1991 High Performance Computing and Communications Act. The Committee's bill attempts to address concerns within the computing community about interagency coordination in the government-wide Networking and Information Technology Research and Development (NITRD) program generally, and specifically within the high-performance computing community. See <http://www.cra.org/govaffairs/blog/archives/000080.html>.

[Membership](#)

[What's New](#)

[Home](#)

CRA Does
Computing Research
Human Resources

Tapia 2003



CAPP



Grad Cohort



CRA-W





2003
Undergraduate
Awardees

2004 Undergraduate Awardees

Thuc Vu - CMU

Anna Cavender - U. Oregon

Ethan Eade - Duke

Heather Wake - U. South
Carolina

CRA Does
Computing Research
Community Building

Why Grand Challenges?

- Inspire creative thinking
 - Encourage thinking beyond the incremental
- Some important problems require multiple approaches over long periods of time
- Big advances require big visions
 - Small, evolutionary steps won't take us everywhere we need to go

Grand Challenges Conferences



A scenic view of a mountain range with green slopes and a modern building in the foreground. The sky is clear blue, and the mountains are covered in dense evergreen forests. The building is a multi-story structure with a mix of brick and concrete, situated on a hillside.

All happening at Snowbird:

CRA Bi-Annual Meeting

IEEE-CS IT Strategy

NSF PI Investigator's Meeting

CRA Board of Directors

IT Deans

Leadership Summit

CDC Executive Committee

All brought to you by the Board, the Volunteers and the Staff





The State of CRA
is, indeed, good

**Thank You for
Supporting CRA!**