Special to CRN

First there were five, now there are four, and soon there will be two. In late March, the National Science Foundation (NSF) announced it would discontinue funding two of its four supercomputer centers: the Cornell Theory Center and the Pittsburgh Supercomputing Center (PSC).

The two remaining centers—the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign (UIUC) and the San Diego Supercomputer Center at the University of California at San Diego—will continue receiving federal support through a new program, Partnerships for Advanced Computational Infrastructure. PA C1 is billed by NSF as the next phase of high-end computing.

Following a three-year process of program review and proposal submission, NCSA was awarded funding for its National Computational Science Alliance (the Alliance) partnership, and the San Diego Supercomputer Center got the go-ahead for its National Partnership for Advanced Computational Infrastructure (NPAC I).

The Alliance is led by Larry Smarr, current director of the supercomputer center at UIUC, and includes the following institutions as major (proposed) partners: the California Institute of Technology, the University of California at Berkeley, the University of California at Los Angeles, the University of Maryland, the University of Michigan, and the University of Texas at Austin. Together these institutions will prototype a "National Technology Grid." According to a press release, the grid "will serve as an early model for a full-scale A dvanced C omputational Infrastructure, which will be built by the computer, communications and software vendors to support our nation's computational scientists and engineers in academia, industry and government."

The Alliance is organized around four sets of teams:
- The A pplications Technologies Team, which will focus on the following six science and engineering areas: cosmology, chemical engineering, environmental hydrology, molecular biology, nanomaterials and scientific instrumentation. Funding for the basic scientific research will come from team members, an NCSA press release said.
- The E nabling Technologies Teams, which will study tools for parallel computing, heterogeneous computing, and data and collaborative computing.
- Regional Partners, which includes the Committee on In Vitro Fertilization (CIVIT), the National Resources Conservation Service, and the Experimental Program to Stimulate Competitive Research.

The News Journal of the Computing Research Association

IT companies heavily courting CS grads

By Louise Arnheim

Special to CRN

A s the 1996-97 academic year comes to a close, the outlook for computer science graduates remains bright. According to the Bureau of Labor Statistics (BLS), computer science is among the top 10 occupations experiencing faster-than-average job growth, and it will continue to do so beyond the year 2000. Not only is the demand for such expertise high, but the natural churn of the job market (such as current workers moving into management or retiring) will result in "tens of thousands" of positions opening up each year.

But as they consider job offers from employers nationwide, computer science graduates may find themselves heavily courted by companies with a particular need: information technology. According to a new report by the Information Technology Association of America (ITAA), 190,000 IT jobs nationwide remain unfilled, and demand is increasing.

At the request of its 11,000 direct member and affiliate member companies, ITAA conducted a survey of 2,000 large and midsize IT and non-IT companies. The survey's findings, listings of other recent reports, and anecdotal evidence of the IT shortage are included in the 51-page report, Help Wanted: The IT Workforce Gap at the Dawn of a Century. Concerned that U.S. competitiveness in IT is at stake, ITAA focused the report on training, recruitment and education of current and future IT workers at both IT and non-IT companies.

ITAA defines IT as "the study, design, development, implementation, support, or management of computer-based information systems, particularly software applications and computer hardware."

A cording to ITAA, the 190,000 (weighted) estimate is on the low side because its survey did not include federal, state or local governments; nonprofits; and smaller companies. To make up for the existing shortfall, companies are spending ample sums to recruit new employees, often luring them away from rival firms. For example, IT companies that had more than 100 vacancies expended more than $750,000 annually in recruiting more employees, ITAA says.

Such recruitment efforts essentially capitalize upon the training and investment made by rival companies. "Hiring individuals by other firms does nothing to expand the pool of potential workers but merely shifts such individuals around in the marketplace," the report said.

Additionally, training and recruitment will not be sufficient to meet future needs, ITAA says. More than 80% of IT companies surveyed for the report anticipated their need to hire new employees would increase. "Education will be a key facet of any solution to this problem," the report said.

Undergrad interest waning

However, as demand for computer science and related degrees is rising, fewer students are electing to pursue such degrees. ITAA points out that between 1986 and 1994, the number of undergraduate degrees in computer science dropped 43%—from 42,195 to 24,200. Further, ITAA reports that interest among the next generation of college students may be waning. A survey, ITAA refers to a study of 4 million high school sophomores. Of the 750,000 who considered pursuing science or engineering degrees, only 200,000 eventually graduated with a bachelor's

The News Journal of the Computing Research Association

NSF Supercomputer Center sites are announced

By Louise Arnheim

Special to CRN

The fact that federal funding to at least one supercomputing center would be cut apparently has been anticipated for some time.
Expanding the Pipeline

A decade in the university pipeline

By Tracy Camp

The number of women entering the computer science pipeline and earning B.A./B.S. degrees is decreasing which is of extreme concern because fewer women entering the pipeline means that, over time, fewer women will go on to earn their Ph.D.s in computer science.

The 1996 CRA Taulbee Survey, which was published in the March CRRN, included results on the gender of bachelor’s and master’s recipients for the Ph.D.-granting departments that responded to the survey (Table 4 in the story). According to this table, only 16% of the recipients awarded bachelor’s degrees during the 1995-96 academic year were women.

A though 16% is extremely low, it is not substantially different from previous surveys; in the results of the 1994 and 1995 surveys, the percentage of women awarded bachelor’s degree was 18%. Thus, 16% does not sound so bad. Or, is it?

Instead of only considering the gender of degrees awarded at departments responding to the survey, I will focus on how well women are doing across all departments awarding B.A./B.S., M.S., and Ph.D. degrees in computer science. In the three tables accompanying this article, the information on numbers of degrees awarded in computer science during the decade 1984-94 is from the Education Department’s National Center for Education Statistics. (The number of degrees awarded during the 1994-95 academic year is not yet available.) The center classifies computer science departments within the computer and information sciences (CIS) category.

Table 1 shows the percentage of students within different fields of study in CIS for the Ph.D., M.S., and Ph.D. degrees awarded. As illustrated, the bulk of the degrees awarded are in the general computer science category, with information science and systems a distant second.

Ph.D. level looks good

At the Ph.D. level, there is good news. Table 2 lists the number of Ph.D., M.S., and B.A./B.S. degrees awarded in CIS during 1984-94 and the percentage of female recipients. The number of Ph.D. degrees awarded in CIS continues to increase. In the most recent academic year available (1993-94), the percentage of Ph.D. degrees awarded in CIS to women in 1993-94 is 50% higher than it was a decade ago (15.4% versus 10%). At the M.S. level, the news is mixed. The good news is that the number of M.S. degrees awarded in CIS continues to increase. The bad news is that the percentage of M.S. degrees awarded in CIS to women has steadily decreased since 1990. Furthermore, 1993-94 had the lowest percentage of women awarded M.S. degrees during the 1984-94 period. At the B.A./B.S. level, there is only bad news. Table 2 shows that the number of B.A./B.S. degrees awarded in CIS continues to decrease, and this decrease is occurring at a faster pace for women.

This decrease is especially upsetting when one considers the total population receiving B.A./B.S., M.S., and Ph.D. degrees. Table 3 lists the total number of B.A./B.S. degrees awarded in all fields during 1984-94 and the percentage of the recipients that were women. A s illustrated, the number of B.A./B.S. degrees awarded in all fields continues to increase, and the number of B.A./B.S. degrees awarded to women continues to decrease.

Continued on Page 3

Women affected by lack of visibility

By Carolyn Leighton

In a 1996 study conducted by the Freedom Forum Media Studies Center, it was found that women were quoted or referenced in only about 14% of business-related stories.

Here are some noteworthy findings from the Women, Business and the Media Conference, co-sponsored by Catalyst and the International Women’s Media Foundation:

• Even as women “become a critical mass inside newspapers and networks,” the number of female sources are not increasing. Said Linda Wertheimer of National Public Radio.

• The problem, according to Catalyst president Sheila Wellington, is “three-pronged: Women don’t come forward; companies don’t put them forward; and the press use women primarily for ‘women’s stories’ such as those on work-family balance issues—rather than for business stories.”

• Not only are the views of half the population omitted, but credibility and advancement in the professional world can be negatively affected by lack of visibility and name recognition.

I believe companies are poised as never before to actively recruit and open up positions of influence previously closed to women. We have heard many Silicon Valley leaders openly state they appreciate the benefits of hiring women into key positions and are looking for more effective ways to implement that process.

This was the issue that moved Women in Technology International (WITI) in 1994 to establish an annual conference and the impetus behind the establishment of June as Women in Science & Technology Month, the WITI Hall of Fame and the association’s first annual CEO Recognition Award ceremony at its 1997 conference.

WITI works to highlight noteworthy talents and insights of women (some of whom remain relatively unknown outside of their workplace) and to identify sound strategies that have been used successfully by men and women working in and with technology organizations.

Are you open to a new workplace paradigm? I then think about these questions:

To management:

• How many% of the women occupy vice president and above positions in technology organizations (even though a significantly higher percentage are qualified), does it make sense to require a vice president or higher title when you want to add a woman (or minority) to your board?

• In looking for the best-qualified and the most capable, and, considering women have often accepted lesser titles, does it make sense to continue requiring certain titles as criteria for positions you want to fill?

(For example, I have a friend who cannot get past the title of “admin.”, but she has effectively run her boss’s projects for years. Every time she interviews for a project manager position, they take one look at her title, and the process stops there.)

• Have you taken time to understand why effective women may be leaving your organization to start their own projects?

• Are you taking time to provide the women in your organization the support they need and require as a minority in a male-
increase is at a faster pace for women than for men. Thus, even though more women are earning B.A./B.S. degrees, the percentage of B.A./B.S. degrees awarded to women in CIS continues to decrease. This is extremely bad news.

Pipeline shrinkage

The pipeline shrinkage problem for women in computer science is a known phenomenon and is illustrated in Table 2. For example, although 28.4% of the B.A./B.S. degrees awarded in CIS during the 1984-94 decade were to women, only 25.8% and 15.4% of the M.S. and Ph.D. degrees awarded in CIS, respectively, went to women. One way to increase the percentage of women at the high end of the university pipeline is to get more women to enter the low end of the pipeline. Hence, it is critical that the decrease in the number of B.A./B.S. degrees awarded in CIS seen during the 1984-94 decade be reversed. There is positive evidence that this will occur.

The 1996 CRA Taubee Survey indicates that the number of B.A./B.S. degrees awarded in CIS should increase; the number of new bachelor's students enrolled in computer science Ph.D.-granting departments increased 40% this year. (The increase is actually greater than 40% because more departments completed the 1995 survey.) Furthermore, this 40% increase follows a 5% increase in 1995.

The number of B.A./B.S. degrees awarded in CIS at Ph.D.-granting departments should dramatically increase in the near future. In addition, one would expect to see a corresponding increase in the number of B.A./B.S. degrees awarded in CIS at non-Ph.D.-granting departments. One question, however, remains: How will the future increase in the number of B.A./B.S. degrees awarded in CIS affect the percentage of women recipients? During 1984-94, the decrease in the number of B.A./B.S. degrees awarded was at a faster pace for women than for men.

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### Conferences & Workshops

#### Upcoming CRA workshops

In response to requests of attendees at the 1996 CRA Conference at Snowbird, the Computing Research Association (CRA) is sponsoring two workshops oriented on academic careers and another on effective teaching.

The workshops will be held June 4-6 in Denver at the Oxford Hotel and will immediately follow the International Symposium on Computer Architecture (ISCA '97). We encourage you to register early because space in the workshops is limited, and hotel rooms are in short supply during the workshops.

Junior faculty and senior graduate students should be encouraged to attend, as the CRA believes such workshops can help lead junior faculty to successful careers.

For more information or to access a registration form, go to CRA's Web page at http://www.cra.org and click on What's News, send an e-mail message to info@cra.org or call 202-234-2111.

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#### CRA ACADEMIC CAREERS WORKSHOP

The CRA Academic Careers Workshop is oriented to both men and women, unlike previous CRA career workshops, which were oriented toward women's issues. The target audience is faculty in the beginning years of their careers and senior graduate students contemplating an academic career. The workshop will begin June 4 at 2 p.m. and conclude June 5 at noon.

I'm very excited about the speakers at the Academic Careers Workshop. By holding the workshop right after the International Symposium on Computer Architecture, we've been able to get department chairs and college deans to volunteer to give the kind of career advice we all wish we'd had at the beginning of our careers,” workshop organizer David Patterson said.

Workshop sessions include:
- The tenure process
- Selecting and managing a research project
- Getting funding
- Networking with other researchers
- Time-management families issues

Workshop presenters include:
- Janice Cuny (CRA - W co-chair, University of Oregon)
- Susan Enges (NSF Presidential Young Investigator, University of Washington)
- John Hennessy (Dean of the College of Engineering, Stanford University)
- Mary Jane Irwin (Vice chair of CRA and ACM, Pennsylvania State University)
- David Patterson (CRA Board chair and past Computer Science Department chair, University of California at Berkeley)
- Bobby Schnabel (A associate dean of academic affairs for engineering, University of Colorado at Boulder).

### CRA EFFECTIVE TEACHING IN CS&E WORKSHOP

The purpose of CRA's Effective Teaching in Computer Science and Engineering Workshop is to help new faculty members teach more effectively. This highly interactive workshop includes theoretical material on learning styles and instructional objectives, and practical tips on effective lecturing, creative problem-solving and collaborative learning. Attendees will actively participate individually, in pairs and in small groups.

The workshop will begin June 5 at 2 p.m. and June 6 at noon.

This workshop is intended for new faculty members teaching college and university courses in computer science and engineering. If space is available, more experienced faculty are welcome to attend.

The workshop leader is Michael R. Williams, a professor of computer science at the University of Wisconsin, Judith Klavans of Columbia University, Amy Marshall of Boston University, Joan Feigenbaum of AT&T, Jeanne Ferrante of the University of California at Santa Barbara, Deborah Joseph of the University of Wisconsin, Judith Klawe of Columbia University, and Pamela McCorduck, author of The Futures of Women.

The goal of technical topic sessions is to highlight a broader range of work by women engineers and researchers within the computing fields. The topic sessions will run in parallel, providing an opportunity for interchange.

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NAE elects 85 new members

The National Academy of Engineering recently elected 85 new members and eight foreign associates. This brings the total U.S. membership to 1,893 and the number of foreign associates to 153. NAE membership is among the highest professional distinctions accorded to engineers, and membership is given to those who have demonstrated "unusual accomplishment in the pioneering of new and developing fields of technology," according to NAE. Newly elected engineers in computer science and related fields are:

- Ruzena Bajcsy: Professor and director, General Robotics Active Sensory Perception Laboratory, Department of Computer and Information Science, University of Pennsylvania. For development of "active perception" methods and for leadership in the community.
- Donald D. Chamberlin: Research staff member, Computer Science Department, IBM, 1 Ibm-3a Research Center. For contributions to the SQL database query language.
- Steven P. Jobs: Chief executive officer, NeXT Software Inc. For contributions to the creation and development of the PC industry.
- Alan Kay: A colleague, Advanced Technology Group, Apple Computer Inc. For inventing the concept of portable personal computing.
- Robert M. Metcalfe: Vice president for technology, International Data Group. For development of the Ethernet.
- Alan F. Shugart: Co-founder, president and CEO, Seagate Technology. For contributions to disc memory devices and interfaces for PCs.
- Charles Simonyi: Chief architect, Microsoft Corp. For developing widely used desktop productivity software.
- Robert F. Sproull: Vice president and Sun Fellow, Sun Microsystems Inc. For work in computer graphics and digital printing.
- Michael R. Stonebraker: Professor, Department of Electrical Engineering and Computer Science, University of California at Berkeley. For development and commercialization of relational and object-relational database systems.
- Margaret H. Wright: Distinguished member of the technical staff, Bell Laboratories, Lucent Technologies. For development of numerical optimization algorithms and for leadership in the applied mathematics community.

Journals and professional associations, the 1994 Award winners include:

- Hopper from Page 4

Hopper from Page 4

Attended to hear talks specifically related to their own fields. For the first time, technical topic sessions at this year's conference will feature shorter talks by students and young professionals just starting their careers. Workshops, panels, seminars and birds-of-a-feather discussion groups will be included on the agenda both days of the conference and present an unparalleled opportunity for students and professionals in the field to meet and exchange their views and experiences. Workshops at the 1997 conference will impart information valuable to attendees just beginning their careers and to those who have already established themselves within the field. Topics to be covered range from a session exploring the need for and art of self-promotion to "Women in the History of Computer Science," a retrospective of the contributions of women to the development of modern computing.

Birds-of-a-feather sessions will convene for women of color, A slain woman, Hispanic women, American women, lesbian/bisexual, female graduate students, female junior faculty members and young professional women, providing an opportunity for members of these groups to share their special experiences and discuss the different challenges and obstacles encountered by women in these categories. The birds-of-a-feather sessions, a popular component of the Grace Hopper Celebration program, provide a natural forum for networking and mentoring.

Supporting the conference

Thanks to many supporters from government, industry and the professional associations, this year's conference enabled more than 450 women to come together and share their work. Continued on Page 12

COOK WINS CANADIAN AWARD

Stephen A. Cook of the Department of Computer Science at the University of Toronto was awarded the Canadian Council's Killam Memorial Prize for Engineering/Computer Science. The $50,000 Canadian Killam Prizes are given annually to 14 Canadians to recognize outstanding achievements by Canadians in any of the disciplines in the natural sciences, health science and engineering. Cook originated the field of NP-completeness and established strong links between mathematical logic and complexity of computations. His 1971 paper "The Complexity of Theorem Proving Procedures" is universally regarded as the most important paper in theoretical computer science, an announcement from the Canadian Council said.

1997 ACM Fellows named

The Association for Computing Machinery recognized 41 of its members for their achievements in computer science and information technology and their contributions to further ACM's mission. These new inductees join the 240 current Fellows, bringing the total to 281 ACM Fellows from around the world.

The 1997 ACM Fellows are:

- Ian A. Kiyldish, Georgia Tech
- Jean-Loup Baer, Univ. of Washington
- Victor Basili, University of Maryland
- Barry Boehm, Univ. of Southern California
- Girish Chintalac, Boston University
- Daniel Couger, University of Colorado
- Bruce Cohen, Univ. of Massachusetts
- Gordon B. Davis, Univ. of California
- David D. Dabkin, Princeton University
- Herbert Freeman, Rutgers University
- Hector Garcia-Molina, Stanford Univ.
- Irene Greif, Lotus Development Corp.
- Yuri Gurevich, University of Michigan
- John Hennessy, Stanford University
- Ziv Kedem, New York University
- Richard Kemmerer, Univ. of California
- Harold Lawson, Lawson (A B of Sweden)
- Den-Tou Lee, Northeastern University
- Richard Lipton, Princeton University
- Nancy Lynch, MIT
- Samuel C. Masfud, University of Washington
- Kenneth Sevcik, University of Toronto
- Chetan Tule, Tel Aviv University
- Alan C. Shaw, University of Washington
- Ben Shneiderman, University of Maryland
- Kenneth Steiglitz, Princeton University
- Donald Towsley, Univ. of Massachusetts
- Elaine Weyuker, AT&T Research
- Peter Widmayer, ETH Zentrum
- Robert Wilensky, University of California
- Philip S. Yu, IBM T. J. Watson Research Ctr.
- Paolo Zanella, European Bioinformatics Inst.

A mir Pnueli, a professor of computer science at the Weizmann Institute of Science in Israel, received the Aiso award for Computing Machinery's 1996 A M . Turing Award in May 1997. Pnueli was honored "for seminal work introducing temporal logic into computer science and for outstanding contributions to program and system verification," an ACM announcement said.

His landmark 1977 paper "The Temporal Logic of Programs" resulted in a major breakthrough in the verification and certification of concurrent and reactive systems.

T he ACM A M . Turing Award is given annually for technical achievements in the field of computing deemed by a jury of leading professionals to be of lasting and significant importance to the computing community. It is accompanied by a prize of $25,000, contributed by Lucent Technologies Inc.

Aiso, Peter J. Denning, associate dean for computing and chair of the Department of Computer Science at George Mason University, received the 1996 Karl V. Karlstrom Outstanding Educator Award. Denning was honored for his long-standing efforts to shape the computing field and convey its nature to computer scientists and the broader scientific community.

This year's award recognizes an outstanding educator for achievements in teaching methods and for effecting new CS&E curriculum development. It carries a prize of $5,000, which is supplied by the Prentice-Hall Publishing Co.

Other 1996 ACM award winners include:

- Distinguished Service Award. A medal on the basis of value and degree of service to the computing community. Winner: Hal Biegel, University of Arkansas.
- Outstanding Contribution to ACM Award. The award is given to individuals selected on the value and degree of service to ACM. Winner: Robert M. Aiken, Temple University.
- Grace Murray Hopper Award. A award to the outstanding young computer professional of the year. Winner: Shafira Goldberger, Massachusetts Institute of Technology.
- Paris Kanellakis Theory and Practice Award. This new award honors specific theoretical accomplishments that had a significant and demonstrable effect on the practice of computing. Winners: Leonard A. di lemma, University of Southern California; William Diffie, Sun Microsystems Inc.; Martin Hellman, Stanford University; Ralph M. Merkle, Xerox Corp.; Ronald Rivest, Massachusetts Institute of Technology; and A. Shamir, Weizmann Institute of Science (the six founders of public-key cryptography).
- Doctoral Dissertation Award. Presented annually to the author(s) of the best doctoral dissertation in computer science and engineering. The award includes $1,000 and publication of the dissertation(s) by Springer-Verlag.

Winners: Xiaojuan Tu, University of Toronto, and Carl Waldurger, Massachusetts Institute of Technology.

The 1996 ACM award winners include:

- Raymond M. Taler, University of Pennsylvania
- Ronald Perrott, Queen's University
- Nicholas Pipperger, Univ. of British Columbia
- Vaughan Pratt, Stanford University
- John Reif, Duke University
- Ray Reiner, University of Toronto
- Paul Schneck, Mritek Systems Inc.
- Robert Sedgewick, Princeton University
- Kenneth Sevcik, University of Toronto
- Michi Shintani, Tel Aviv University
- Alan C. Shaw, University of Washington
- Ben Shneiderman, University of Maryland
- Kenneth Steiglitz, Princeton University
- Donald Towsley, University of Massachusetts
- Elaine Weyuker, AT&T Research
- Peter Widmayer, ETH Zentrum
- Robert Wilensky, University of California
- Philip S. Yu, IBM T. J. Watson Research Ctr.
- Paolo Zanella, European Bioinformatics Inst.
what we had even hoped for,” said received from NCSA and NPACI complementary.” They went “beyond partnering, and both “are highly Both proposals, he said, encompassed Computing, “in essence, they ‘got it.’” NPACI proposals “winners?” Accord- spokesperson, anywhere from half to keep their respective centers operat- Mellon University) and Cornell University have announced plans to supercomputing centers will be given the closing of the John von Neumann Supercomputing center would be “simple arithmetic.” The fact that Pitts coped “real service to the country” over the past 12 months but that the issue was “simple arithmetic.” The fact that federal funding at least one supercomputing center would be open to anyone with a research proposal and a computer, not the exclusive domain of a select few. The Pittsburgh and Cornell had “provided supercomputing for several years. The House has occasionally passed bills, but the Senate has been uninterested. A through an authorization bill is not technically necessary from year to year unless Congress wants to change the agency’s course, consideration of a bill offers an opportunity for the subcommittee to publicly examine NSF’s activities and priorities. The subcommittee also has jurisdiction over N.A.S.A. and can be expected to examine to the ongoing evolution of the space agency’s mission.

Washington Update

Paul Young, senior adviser to N.S.F. on Computer and Information Science and Engineering Directorate. “The proposals expanded the roles and impact of the leading-edge sites. The partnerships will maintain the current leadership in computational science. They will further the use of computers in all disciplines of research and offer new educational opportunities for people ranging from kindergartners through Ph.D.s.”

Computing Research News was learned that during the proposal process NSF had suggested to PSC that it partner with UIUC. However, because the arrangement would have required the Pittsburgh facility to move its computers (as well as several staff members) to Illinois, PSC declined that course of action. In addressing a reporter’s question about closing the Pittsburgh supercomputer center in particular, Karin said the “center has been a valuable resource” and noted that the PSC had formed “a strong bond” with Cray Research Inc.

Smarr also noted how the closing of the John von Neumann Supercomputing Center (at Princet on) University eight years ago occurred in a shorter time period than that allotted for PSC and the Cornell center.

The recent announcements are the culmination of an evaluation process that began three years ago. In fall 1994, the National Science Board, which oversees NSF, in- structed the foundation to review the supercomputing centers. A few months later, a task force chaired by Ed Hayes of Ohio State University was convened to study these issues. The task force of the NSF Supercomputer Centers Program to develop future plans.

Beginning with the next business day, the system will search all new or updated announcements in the “FEDIX” database of federal opportunities, including the Commerce Business Daily and the NIH Guide, looking for matches to the user’s research interest profile.

FEDIX is an Internet-based service that provides comprehensive information about federal opportunities to the research and higher-education communities nationwide. With 11 sponsoring federal agencies, 8,000 data files and about 70,000 unique Web sites using it each month, FEDIX has become an important electronic means of bridging the information gap between government and academia with regard to research and education programs.

Researchers and educators can search FEDIX themselves or subscribe to FEDIX, and have targeted opportunities sent to them automatically via FEDIX.

Another possible issue would be NSF authorization. The Senate Commerce Committee has jurisdiction over NSF, which in turn made the following comments to NSF. The Senate Commerce Committee has jurisdiction over NSF, which in turn made the following comments to NSF. The Senate Commerce Committee has jurisdiction over NSF, which in turn made the following comments to NSF.

Frist to chair subcommittee

Sen. John M. Breaux (R-La.), chair of the Committee on Commerce, Science, and Transportation, announced that Bill Frist (R-Tenn.), has been selected to chair the Subcommittee on Science, Technology, and Space. Frist, a first-term senator elected two years ago as part of the Republican takeover, was a nationally known heart transplant surgeon at the time of his election. It is known science policy are not well known. However, as a medical specialist who has published several papers in his field, he has substantial science education and familiarity with research, probably more than anyone else in the Senate.

Rockefeller (D-W.V.), will return as ranking Democrat on the subcommittee.

It is still an open question what issues the subcommittee will choose to take up in the 105th Congress. The Government Accounting Office (GAO) has been asked whether federal research funding will undoubtedly be on the agenda (see http://www.cra.org/ policy for the text of the bill). Kay Bailey Hutchison (R-Tx.) is a member of the subcommittee.

NGI initiative workshop in May

Since last October, when President Clinton announced in general terms a new Next-Generation Internet (NGI) Initiative, government science agencies have been struggling to fill in the details of the new initiative. Wherever details of its final shape, the program will clearly have a large research component.

To help the planning process, the Computing Research Association will be co-hosting a workshop on the research agenda on May 13-14. The Computer Systems Policy Project and the Cross Industry Working Team will co-host the event.

The workshop, to be held in the Washington, D.C. area, will bring together nearly 100 researchers from academia and industry to examine fundamental research questions that need to be addressed to meet the NGI program goals. Attendees will examine such topics as network management, quality of service, middleware, security and NGI applications, and will try to identify the most critical research needs.

CRA will publish a report of the meeting and also produce a videotape report on the event.

Federal funding opportunities

FEDIX Opportunity Alert!!! (FOA) is a free e-mail service funded by the federal government that automatically delivers targeted research and education funding opportunities, including computer engineering opportunities, to researchers, educators and students. In its first year of operation the service has logged more than 30,000 subscribers, who have so far received over 2 million e-mail alerts.

Users can subscribe to FOA by going to http://www.rams-fe.com/oppalert.htm, registering and selecting the keywords representing their research interests. Beginning with the next business day, the system will search all new or updated announcements in the “FEDIX” database of federal opportunities, including the Commerce Business Daily and the NIH Guide, looking for matches to the keywords.

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FEDIX was developed under an Energy Department grant and is sponsored by its participating agencies. The service is free to users. Participating agencies include the Department of Energy (DOE), the Department of Defense, the National Institutes of Health, the Office of Naval Research, the Agency for International Development, the State Department, the National Science Foundation, and the Energy Department.

Centers from Page 1

Research Resources; Energy’s

Supercomputer Centers Program

report of the Task

the current program ends this fiscal

Institutes of Health; the Office of Naval Research; the Agency for International Affairs; NASA; the Air Force Office of Scientific Research; the National

Washington Update

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Labor force from Page 1

May 1997 COMPUTING RESEARCH NEWS

Human Resources

Commerce requests paper on human resource needs

The Commerce Department recently invited the Computing Research Association to submit a brief policy paper on human resource needs in the area of software production. The context of the request was the continuing discussion over the role of foreign nationals in the US labor market. As we pointed out in our response, computer science and engineering fields are only one fraction of the total work force that goes into software production.

The complete policy paper is available at CRA’s Web site (see http://www.cra.org; click on Government Affairs). The following is a brief summary of the response.

Background observations

1. The demand for software professionals is growing rapidly. Although the magnitude of supply and demand is hard to quantify even over the short term and very difficult to project into future years with any precision, the entire information sector continues to grow rapidly. The demand for software professionals far outstrips the supply. In particular, there is no reason to believe that our national universities are taking seriously the need for software professionals or educational programs slots from qualified Americans. Quite the contrary: foreign national software experts are contributing to our nation’s storehouse of knowledge and to our software capability broadly and flexibly.

2. The nature of software jobs and the skills required to hold them are widely varied and changing rapidly. A software production team may include artists, contract specialists, software designers, database experts, marketing and sales people and customer service representatives. Technological change also creates a rapid change of labor requirements.

Computing departments must produce graduates who can find rewarding jobs that fill the needs of the current market but who are also broadly educated and flexible.

3. Educational institutions need to sustain a stable, long-term response in growth for demand in their graduates. Throughout their brief history as an academic discipline, computing departments have experienced periods of surges and depressions followed by slumps. According to the 1996 CRA Taulbee Survey, undergraduate enrollments are up sharply. CRA’s members are trying to strike a balance, sustaining a reasonable growth in the production of graduates at all levels while avoiding the painful consequences of overproduction.

4. The computer science and engineering departments that are members of CRA only produce a small— albeit a critically important— portion of the workers loosely labeled as “information” or “software” professionals. They are deeply trained in such specialties as computer architecture, data communications, systems, data structures, information security, object-oriented programming, artificial intelligence and virtual representations. The complex, advanced applications of today could not be built without the talent and knowledge they possess.

5. Foreign nationals constitute an important and welcome part of the student population and of academic faculty and industrial research staff. In response to the original Commerce request regarding foreign-national employment patterns in computing research, we posed some questions to the CRA Board of Directors.

The results are best anecdotal. However, our university respondents suggested that nearly 40% of the new hires last year were foreign nationals. Our numbers also suggest a similar proportion of foreign-national researchers work in US industrial labs. Several of those who responded said they expected the proportion of foreign nationals in academia and industry to increase over the next several years.

A harder problem is the enormous administrative burden of qualifying a foreign national to be hired. In the words of one respondent, “The [high] success rate of attempts to hire these people through the federal approval process is not a valid measure of how tough it is to hire foreign nationals. [We have] sometimes spent one week processing an application [as an indication that the process is too easy]. In fact, the legal and financial barriers are so high that only rock-solid cases are brought to this level.”

To repeat our point above, foreign nation software experts make an important contribution to the nation’s technical strength, and there is no evidence that American experts are displaced.

Policy recommendations

Our specific recommendations are as follows:

• Do no harm when undertaking immigration reform and, if and when possible, remove unnecessary barriers.
• Invest in research that improves the effectiveness, quality and ease of production of software.
• Federal policies need to encourage steady and consistent growth.
• Federal programs that reach out to encourage women and under-represented minorities to enter the computing fields are a sensible and desirable response to the growth needs of the software industry.

It is in the self-interest of the field and of the nation that we try to address this issue. CRA has been quite active in its work. But there is also a major role for the science agencies to play.

Industry expectations

Is higher education out of sync with what the real world wants? That particular characterization, Herman, “is a bit strong, but not far off the mark.”

Herman illustrated by telling the story of a local employer who is very impressed with M aryland graduates and hires them “by the carload.” To ensure the best preparation possible for future graduates, Herman asked the employer what additional skills or experience might be needed. The employer referred to an ability to work on a piece of a long-term project and integrate it with other pieces.

Consequently, Herman said, Maryland is developing a Corporate Scholars Program that will provide students with internships “more fully woven into the academic experience.”

New courses based on private-sector needs are now being developed, and outside expertise is being brought in to work on prototypical problems. But, Herman pointed out, there must be a “liaison from the other side, and the private sector has shown in word and deed” considerable willingness for a closer partner- ship along these lines.

Involving corporations

In a similar manner, Thomas M. Azzuzi, interim dean at George Washington University’s School of Engineering and Applied Science, encourages the private sector to become more involved in higher education—to help shape curricula and provide internship oppor- tunities.

Corporations have been “gener- ous” in donating funds, Mazzuchi said, but direct involvement is needed. (In the ITAA survey, 28% of IT company respondents donated money to higher education; 40% of those making donations designated the funds be spent to improve IT curriculum.) “If companies can suggest curriculum structure to meet their needs,” he said, “I don’t know of any university that would ignore such suggestions.” GWU’s School of Engineering works with an advisory panel of local industry representatives who provide such guidance.

Undergraduate students at George Washington can participate in a co-op program that enables them to gain real world experience. At the master’s level, graduates can opt to take project-oriented courses and work for area companies in lieu of writing a thesis.

“The breakdown in communica- tion between industry and education should be a concern for everyone,” Mazzuchi said. When companies have to invest money training workers because of this breakdown, it results in lost productivity to the nation as a whole.

How is future demand likely to shape up? To meet the growing demand for IT skills and expertise, must every declared computer science major seek a Ph.D? Herman said the importance of master’s level graduates is now being recognized. There is also a greater need for bachelor’s degrees, he said.

There is “an immediate need for basic infrastructure people (i.e., those who set up and monitor networks),” Mazzuchi said. At those needs are being filled, R&D will continue to grow, and Ph.D.s will continue to be in demand, he said. Mazzuchi plans to use the ITAA report as a recruit- ment tool for faculty and students.

Electronic copies of the ITAA report are available by sending an e-mail message to acalhanan@itaa.org specify “ITAA Workforce Study” in the subject field. Or call Shannon Bickford at 703-284-5342.
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#### Division of Information, Robotics & Intelligent Systems

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#### Division of Microelectronic Information Processing Systems

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#### Division of Advanced Scientific Computing

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#### Div. of Networking & Communications Research & Infrastructure

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#### Office of Cross-Disciplinary Activities

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By Arthur L. Norberg

One of the prime agencies for computer R&D funding in the post-
1950 period was the Defense Advanced Research Projects Agency, DARPA, through its Information Processing Techniques Office (IPTO), which operated from 1962 to 1986, selected a series of specific programs in computing to solve bottlenecks in command and control systems.

IPTO’s emphasis on ambitious technical objectives and its years of nurturing the institutional framework for R&D resulted in remarkable technical achievements.

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DARPA’s IPTO had formidable reputation

Its emphasis on ambitious technical objectives and its years of nurturing the institutional framework for R&D resulted in remarkable technical achievements.

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California State University, Los Angeles
Department of Computer Science

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California State University, Los Angeles
Los Angeles, CA 90032

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Hopper from Page 5

In addition, nearly 2,000 videotaped technical lectures were distributed, and conference booklets were sent free of charge to students throughout the United States and Canada. To date, supporters of the 1997 conference include Digital Equipment, IBM Corp., Hewlett-Packard Co., Informix Corp., Texas Instruments Inc., Autodesk Inc., BBN, USWest, Xerox Corp., the American Association for Artificial Intelligence, Kromeda Inc., M.I.T. Electric Research Labs, the N.E.C. Research Institute and the National Institute of Standards and Technology.

The 1997 Grace Hopper Celebration is seeking contributions of about $500,000 to enable the production of a high-quality conference with a low registration fee to ensure a broader and more diverse audience. Contributions from supporters will help offset the general conference costs, the costs associated with student scholarships and travel grants, and the cost of producing and distributing the full-color celebration booklet and video.

The opportunity is still available to support the world’s only technical forum featuring the contributions that women are making to the rapidly changing computer field. The 1997 Grace Hopper Celebration is an opportunity for sponsors to make a visible contribution to the recognition and advance- ment of women in the computer field. In exchange, contributors will be listed in extensive e-mail and Web publicity in a first-class celebration program booklet that will be sent to all female computer science and computer engineering graduate students, and in the conference video series. For more information on contributing to the 1997 conference, contact A nita Borg, Grace Hopper Conference ’97 fund-raising chair. Tel: 415-833-2217; e-mail: borga@dec.com.

Honoring Adm. Hopper

Hopper was a pioneer in the field of computing and an inspiration to women and scientists everywhere. Recognized in 1993 for the 1997 conference, contact Anita Borg, Grace Hopper Conference ‘97 fund-raising chair. Tel: 415-833-2217; e-mail: borga@dec.com.

Hopper was one of only four women in the doctoral program, and her doctorate in mathematics was a rare accomplishment in its day. Hopper was a remarkable woman who faced the challenges of program- ming the first computers undaunted. Her work spanned programming languages, software development concepts, compiler verification and data processing. Yet in true testi- mony to her vision and her invent...