COMPUTING RESEARCH NEWS

The News Journal of the Computing Research Association

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Lawmakers seek to ban online "indecency"

By Juan Antonio Osuna
CRA Staff

Goodbye, alt.sex.bondage. Hello, rec.kids.romper-room.

The ever-proliferating sex groups on the Internet and the increasing boldness of posters have finally raised eyebrows in Washington. And, if certain lawmakers have their way, the heyday of unrestrained expression on the Internet may soon subside.

On March 30, the Senate Commerce Committee voted unanimously in favor of the Communications Decency Act of 1995, legislation that would criminalize any news postings or even private e-mail judged "obscene, lewd, lascivious, filthy or indecent."

The full committee reported the legislation as part of Sen. Larry Pressler's (R-SD) sweeping telecommunications reform bill, S 652. Any person found guilty of originating an "indecent" communication, whether public or private, could face up to two years in jail and a $100,000 fine. This bill would apply to telephone, cable, television broadcast or computer transmissions.

> *Someone found guilty of originating an "indecent" communication, whether public or private, could face up to two years in jail and a $100,000 fine.*

"I want to make the information superhighway safe to travel for children and families," said Sen. James Exon (D-NE), author of the bill.

But civil libertarians argue that making the Internet safe for children should not be done at the expense of everyone else's free speech.

The legislation "may fail to distinguish between consensual and non-consensual activities and between private and public communications," an Electronic Frontier Foundation (EFF) statement said. A "steamy love note sent privately between spouses could be a criminal violation of this statute."

Exon sees his legislation as nothing more than an attempt to extend current law to the digital world. "My amendment [to the Pressler bill] would simply apply the same laws that protect against obscene, indecent or harassing telephone calls to computers."

Modernize versus modify

A Senate committee report repeatedly refers to the act as simply "modernizing" existing law

However, civil liberties groups worry that the bill does more than modernize. "I think it would be a mistake to try to regulate Internet communications as we currently regulate the telephone network," said Marc Rotenberg, director of the Electronic Privacy Information Center (EPIC). "It's clear that this is a very different type of communications environment, and I think the proposal will raise a whole host of problems."

On its face, the bill seems to do nothing more than swap the word "telephone," found in current law with "telecommunications device." However, within the historical context of judiciary interpretations, some say the bill raises new complexities and threats to civil liberties.

"The bill attempts to apply to online media many restrictions that do not apply to printed or verbal expression," the EFF statement said. "Transmitting an online version of a 'lascivious' book could subject the sender to unreasonable fines and imprisonment, while mailing the book in hard copy or reading aloud from the book would be protected under the First Amendment."

All laws depend upon interpretation by the judiciary system, especially laws that tiptoe around the Constitution. The Exon bill, if passed, would most likely force the Supreme Court to revisit the obscenity-versus-free-speech question, as the bill would throw into the federal judiciary spotlight vast areas of human communication that have traditionally gone unnoticed.

Civil libertarians said they only hope that the outcome of this revisiting would at least be consistent with past court decisions.

For instance, the courts have reserved more stringent interpretations of laws governing telephone use for situations in which a person gets an unwanted, harassing phone call. However, consenting adults retain

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News Analysis

Outlook for R&D funding unsure

By Fred W. Weingarten
CRA Staff

To the relief of most in the 104th Congress, including the Republicans and their staffs, the first 100 days of the first session have ground to a close. As promised, the House voted on and, in many cases, passed 10 major pieces of legislation, ranging from detailed reorganization of arcane congressional procedures to such sweeping changes as tax cuts and reform of the welfare system.

Celebrations by some Republican House members were countered by criticisms from outside spoilsports, including Republicans. The critics argued that the Senate had yet to act on most of the 10 items. And even if the more controversial ones were passed, they would likely do so only in a significantly modified form.

Some Republican senators reportedly were less than pleased at being thrust into the role of shock absorber and legislative filter, particularly because some of them were planning to announce or had already announced their candidacy for nomination to the presidency

Cynics also pointed out that, in the rush to pass contract legislation, much of the regular business of the House had been put off

Actually House Republicans faced two major challenges during the first few months of this session. The first challenge was to meet the promises of the Contract with America. The second, and equally daunting, challenge was to organize themselves as a majority party Republicans had to organize the House, invent operating procedures, establish a legislative agenda—beyond the contract—and allocate political leadership, particularly between the revolutionary incoming freshman class and old-timers who had served for many years as minority party leaders. Although most votes on the floor so far have displayed unanimity, stresses between these groups are likely to grow more serious over the year

The freshman class has, by all reports, been remarkably cohesive and single-minded about the revolution they claim they were sent to Washington to carry out. The long-standing traditions of new members finding more senior mentors, keeping quiet for a while and learning the ropes have been ignored. Until now, budget and program cuts have focused on areas in which some reasonable consensus could be found. But friction with the more senior leadership will grow as Congress begins to vote on more favored programs or programs with stronger public support.

The freshmen claim they do not care about re-election and thus are ready to take an unpopular course of action. But widespread unpopularity could cost them their own seats, Republican control of Congress and a chance to win the presidency. It will be interesting to see how the rhetoric of revolution and the reality of political power shape internal politics in the House for the rest of this year

The real evaluation of congressional performance will come from the voters in the next presidential election. From that more distant perspective, the 100-day contract could turn out to be far less significant than it looks now. But it does not seem too soon to ask whether we have learned anything about future prospects for federal research programs, particularly computing research.

Early this year, people in the computing research community expressed great concern about the prospects for funding in their field. Two basic questions were asked:

1) Would frequently expressed

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Opinions

HPCC still a worthy program

By Fred W. Weingarten
CRA Staff

The federal government's High-Performance Computing and Communications initiative has been the focus of attention in the computing research community for about 13 years. Its origins date back to a report prepared by an ad hoc study panel funded by the National Science Foundation and chaired by Peter Lax, the noted applied mathematician at the Courant Institute. HPCC has been an official administration initiative for about six years. And nearly four years ago the HPCC Act (the so-called "Gore" bill) was signed into law

At the best of times, a program that has been around that long would—and ought to—be held up to questioning. How well has it accomplished its intended goals? Is its mission still important? Assuming the overall goals are still valid, is the program as it was designed still the best way to achieve those goals?

But these are not the best of times. Budget pressures on federal R&D are seriously threatening programs in Defense and in civilian science agencies. A new Republican-dominated Congress is asking fundamental questions about the proper role of the government in funding research, particularly research that appears to have direct economic payoff to industry.

In the face of this questioning and these new pressures, it would be reasonable to be concerned about the future of HPCC. This concern is particularly acute in computer science and computer engineering because, over the years, federal funding for CS&CE has come to fall predominantly under the HPCC rubric. It would not be a long jump for congressional challenges of the appropriateness of federal HPCC support to broaden and cover all computing research support.

Some senior researchers in the computing field have been suggesting lately that we need to find a new engine, because this one is running out of gas. While advancing under the HPCC flag, computing research came of age. It moved out of the shadows and became a leading, highly visible component of federal science and technology policy. Budgets grew enormously, as did the influence and workload of the Washington computing research bureaucracy

On the other hand

There are two problems with this argument. First, it is not clear that any politician is on the lookout for new initiatives or programs, and that reticence would particularly include anything that looks like "big science." Few, if any, real champions of science remain in Congress, and those who are there have little influence. One might think that among the newer members, some might be searching to stake out issues on which to build their reputations—somewhat in the way Al Gore made HPCC and the Information Superhighways." But today's political environment is not conducive to that strategy, and most new members came to town looking to make their reputations by closing down government programs, not creating new ones.

Besides, there still may be some life left in the old program. Even considering the negatives mentioned above, HPCC may turn out to be the best chance for making a persuasive case for maintaining support for computing research.

The political climate is not all negative toward HPCC. House Speaker Newt Gingrich and other Republicans are fans of the Internet and lace their talks with references to cyberspace and Alvin Toffler's 'Third Wave." They may not yet have made the connection with research, but the case is there to be made. The Thomas congressional information system that the House leadership takes so much pride in connects to the Internet, is based on a Web server and uses a University of Massachusetts data query system, all of which have come from NSF and Advanced Research Projects Agency research programs.

A strong HPCC program, if properly focused, can help the nation develop and achieve the full potential of a new national information infrastructure. This argument was made persuasively in a recent report, *Evolving the High-Performance Computing and Communications Initiative to Support the Nation's Information Infrastructure*, by the National Research Council's Computer Science and Telecommunications Board. Although it focused on HPCC, it made a much broader argument about the important role computing research has played and the even more critical role it will play in the evolution of the United States as an information society. The report also addressed the politically tough issue of the role of basic research by tracing the flow of ideas from university-based basic research to industrial laboratories to development. It made the vital point that strategic research is not necessarily short-term or applied. There is a long-term and enormous economic and social benefit from fundamental research directed into strategically important areas.

Another important report, *America in an Age of Information*, was recently released by the National Science and Technology Council Committee on Information and Communications. This report developed a strategic plan and a framework to coordinate and manage computing research throughout all federal science agencies. It described computing research programs,

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Republican hostility to programs that had a "technology policy" focus create opposition to long-term research efforts in areas such as the High-Performance Computing and Communications (HPCC) program or, more broadly, all of computing research?

2) Would attacks on the budget deficit and promises to cut taxes result in unbearable pressures on research budgets, regardless of how popular the research programs were with Congress in general?

So far, the answer to both questions seems to be a qualified no.

As expected, industry-focused programs such as the Commerce Department's Advanced Technology Program and the Defense Department's Technology Reinvestment Program experienced some cuts. But, at hearings held in both the House and Senate, some sympathetic comments were made by Republican legislators about both programs.

Long-term research has fared better. The threatened elimination of DOD university research budgets to pay for Defense modernization and peacekeeping mission costs has not occurred in the recision bills that have passed.

National Science Foundation program cuts were confined to facilities (bricks and mortar) programs, and key Republican leaders such as Bob Walker (R-PA) have turned out to be strong advocates of science. Several representatives and staff members have even made encouraging comments about the HPCC initiative.

However, indications for the future are less sanguine. Despite the popularity of science and the general sense in Congress that science is a legitimate function of the government, almost impossible budget pressures remain in executing the longer-term promises.

Still alive is the promise of the middle-class tax cut, with which even the administration has agreed to in principle, if not in detail. If the less enthusiastic Senate passes the cut into law, immediate recisions will have to be found to pay for it.

It promises to be a brutal year for appropriations. House Republicans, angered by the Senate's inability to pass a balanced budget amendment, will push the deficit on a steep downward slope—tax cut or no. House Republicans are talking about eliminating programs and entire agencies, such as the Energy Department. In that climate, even politicians who are friendly to science could wield a sharp ax.

Even the most optimistic predictions have NSF budget shrinking substantially over the next few years. Furthermore, although the overall DOD budget may not shrink much more, a similar scenario may hold for Defense research funding as funds are diverted to such areas as readiness, modernization and pay raises.

The research community can take some comfort in surviving the first 100 days. The comfort is not that cuts were not made, but that they were not as deep as some had feared. That is not much solace to the science agencies. These first cuts will be followed by much more drastic attacks. It is not going to be business as usual for research support.

Expanding the Pipeline

Workshops offer mentoring opportunities

BY Janice E. Cuny

Women in computer science or computer engineering graduate programs often find themselves an isolated minority. Many departments have an overwhelmingly male enrollment and few, if any, female faculty members to serve as mentors or role models.

In response, the CRA Committee on the Status of Women in Computing Research (CRAW), with support from the National Science Foundation, organized a series of workshops that provide mentoring opportunities for women. The workshops bring women just starting their academic careers—either advanced graduate students or newly hired faculty—together with more established researchers. The more senior women serve as panelists, giving information and advice on many aspects of academic careers; they also serve as mentors in less formal discussions.

So far, each workshop has been scheduled immediately before a major conference. This enables informal mentoring relationships to continue through the conference. It also makes it possible for workshop participants to attend technical talks and make contacts in their own research areas.

Wide range of topics

The workshops have included panels on a range of topics important to new academics: getting a job, tenure, building a research career, funding, networking, teaching, time management and family issues. They have addressed issues on the mechanics of an academic career, such as developing a markable curriculum vitae, preparing for an interview, putting together a good tenure dossier, advising graduate students, getting funded, being a good teacher and dealing with problem students.

In addition, the workshops have emphasized aspects of starting a research program, such as how to go beyond thesis research, journal versus conference publications, what referees look for, what to do when a paper is rejected, collaborating and promoting work. The workshops have addressed issues in balancing family and outside life with a career. Finally, while the focus had been on expectations at universities requiring a significant level of research, the last workshop included a well-received session on four-year colleges. Each panel had one to four speakers, with as many as 19 senior women participating in a single workshop.

Participants' responses

The panels included formal presentations as well as ample time for discussion and questions. In evaluations done immediately after the workshop, attendees reported that the information presented was extremely useful: It "explained away lots of myths," "it was intensely informative," and "it provided a lot of information that is hard to come by."

Several participants who have been hired into new academic positions since the first workshop responded recently to a second questionnaire. One stated, "The advice that I thought was the most important was of a very common-sense nature, somewhat obvious after the fact but not something that I would have thought of by myself….[As a result,] I think my expectations of the tenure process are very realistic compared to some of the other new faculty here."

Another said, "The workshop was very valuable; there were specific pieces of advice about getting tenure…that were very beneficial to my career."

CRAW has made transcripts of the workshops available, and a number of past attendees have reported that they continue to consult these notes: "I was in the job market the year following the workshop, and I found very many helpful hints among the notes and transcripts. I think one of the biggest lessons I learned is that an academic career requires a lot of explicit managing."

Almost everyone, attendees and panelists alike, thought the workshops had much more to offer than just information: Participants said the workshops provided young women with opportunities to interact with female role models, develop mentoring relationships and establish friendships with future colleagues.

The fact that so many women in computer science and computer engineering were brought together at one time was energizing. Many participants reported that the workshops helped them feel less isolated, and several echoed the comment that "it was great to see so many women in computer science."

One participant said, "It helped me to feel less isolated, and it was motivating and encouraging." Another stated, "The workshop was a wonderful idea, if only because of how encouraging it was to see so many women in the field who are facing the same issues." Another wrote: "Here were more established women professors than there probably are in the whole of CP 10!…Their sharing of their personal histories left me with a sense that I knew them. The diversity of experience was also important—when there is only one woman in your department, and you don't want to be like her, who do you emulate? It's great to know that there are many different paths, leading to different definitions of success."

Another participant agreed. "It was great to see all those women. I attended many conferences related to my research area as a graduate student. I never knew any women attending the conferences who were at my same level careerwise. The first woman I ever saw speak at a conference was myself. The CRA workshop was the first conference where I met women at my level. Also, the women presenters were living proof that women are successful. I see very few senior women."

A minority student said, "I've been laughed at and criticized for pursuing an advanced degree, but this workshop has motivated me to persevere."

About the workshops

Four workshops have been held, with a total attendance of about 200 junior women. The workshops were associated with the Federated Computing Research Conference (FCRC) in May 1992, the Grace Murray Hopper Celebration of Women in Computing in June 1994, Supercomputing in November 1994 and the ACM Computer Science Conference in February 1995. The next workshop will be held in May 1996 in conjunction with FCRC.

The workshops have ranged in length from 90 minutes to 1½ days. The longer ones have been the most successful, because they allow for considerably more interaction among participants. They do, however, involve a significant commitment of time and money, and CRAW continues to experiment with different formats.

CRAW does hope to eventually put together a "how to" guide for women willing to arrange mentoring events at conferences. It also is producing a combined set of workshop transcripts, which will be completed after the 1996 workshop. Transcripts from the initial workshop are available from Phillip Louis at CRA (plouis@cra.org).

For more information or to submit comments or suggestions, please contact Janice Cuny at the University of Oregon (cuny@cs.uoregon.edu).

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including HPCC, in the context of broad national objectives from an applications perspective. The focus was on user needs. This approach was in stark contrast to attempts in the late 1980s to motivate HPCC narrowly in terms of its impact on the competitiveness of the US computer industry—an approach that led to criticisms that HPCC was simply a "bailout" program in disguise for Cray Research Inc. or IBM Corp.

Meanwhile, the administration appointed a new head of the National Coordination Office for HPCC. John C. Toole will replace Donald Lindberg director of the National Library of Medicine (NLM). This appointment means several things. First, it is a full-time appointment for Toole. Lindberg served as coordinator, yet retained his position as NLM director. As HPCC grew, so did the conflicting pressures on his time and attention. Second, Toole is from ARPA. When Lindberg was appointed, the interagency pull and tug over program leadership was so great it seemed inconceivable for someone from NSF, ARPA or the Energy Department to be selected. No one thought NLM wanted to be a lead agency for HPCC, so Lindberg was viewed as neutral.

Lindberg was a senior, respected voice in science policy circles outside the computing arena. He helped legitimized HPCC to that world.

Toole has a great deal of experience in government research program management, particularly in the information technology field. However, he has less external name recognition in the science policy community. This suggests that the administration was looking for someone who had clout within the computing programs of the science agencies and who could bring about a closer coordination. It appears the administration saw less need to legitimize computing research by picking someone from outside the field.

The HPCC program is entering this dangerous time with new ammunition and tools with which to make its case. It seems far better prepared for the fight now than it was in 1994.

Association News

For Your Information

Your support is crucial

BY Phillip Louis
CRA Staff

The past year has been very productive and positive for CRA. A few highlights from 1994-95 include the CRA Conference at Snowbird '94, the Academic Careers Workshop and the CRA Taulbee Survey. (We again would like to express our appreciation for your cooperation on the survey. The results were printed in the March 1995 *CRN* and also are available on CRA's home page.)

This past year, CRA expanded its efforts to recognize the contributions outstanding individuals have made to the computing research community. We recently announced the winners of the new CRA Undergraduate Awards, sponsored by Microsoft Corp. (See accompanying story.)

Randy Katz and the late Eugene Lawler were the winners of the 1995 Distinguished Service Award and the A. Nico Habermann Award.

And congratulations also to the 30 students selected to participate in the CRA Distributed Mentor Project this summer. (Our thanks to Joseph O'Rourke of Smith College, who has overseen this project for two years.)

The 1995-96 board elections are under way. If you have not returned your ballot, do so before May 18. We'll announce the winners in late May. Terms for the new and re-elected members begin July 1.

It's not too late to register for the new Effective Writing in CS&E workshop June 8-9 in Snowbird, Utah. (See the agenda on page 12.)

The items above were successful because of you and because of an active board and a dedicated staff that works hard to get the job done.

We are able to be involved in so many worthwhile activities only if you continue to support CRA by paying your annual dues. You should have received a dues statement a few weeks ago. If you have not, contact me at 202-234-2111 or at info@cra.org. Dues information also is available on CRA's home page (http://cra.org). The dues package includes a list of all the benefits you receive for being a member of CRA. We encourage you to take advantage of all we have to offer; the CRA office is here to serve you.

Send any suggestions you have on how CRA should serve the community to info@cra.org.

If you have not done so already, please take the time to check your address label on the front page and let me know if your address is correct or if it needs to be updated.

I hope you've enjoyed the FYI column. My goal is to remind you of the activities we are involved in and update you on administrative issues.

Send suggestions or comments about this column to Phillip Louis, Computing Research Association, 1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009. Tel. 202-234-2111; fax: 202-667-1066; E-mail: info@cra.org

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CRA selects winners of Undergraduate Awards

The Computing Research Association is pleased to announce the results of the first CRA Outstanding Undergraduate Awards competition. We would like to acknowledge the support of Microsoft Corp. as the sponsor of the first year of this program.

Awards are presented in two categories: Outstanding Female Undergraduate and Outstanding Male Undergraduate. Candidates were nominated by their departments, which were allowed to nominate no more than one candidate in each category. Nominees had to be majoring in computer science, computer engineering or an equivalent program.

"These award winners exemplify the many outstanding young men and women working toward careers in computer science and computer engineering," CRA Board Chair David Patterson said. "Their contributions will provide the necessary scientific and technical foundations for building an advanced information infrastructure and help put it to productive work."

The Selection Committee, consisting of Rena Bajcsy of the University of Pennsylvania, Daniel Huttenlocher of Cornell University and Maria Klawe of the University of British Columbia (committee chair), was impressed by the high quality of the candidates. In addition to choosing an overall winner in each category, the committee recognized a small number of runners-up and several candidates deserving honorable mention.

Outstanding Female Undergraduate

Winner:

- *Diane Tang*, Harvard University, computer science

Runners-up:

- *Lynn SockEng Chua*, Arizona State University, computer systems engineering
- *Mandana Veziri-Faharani*, Carnegie Mellon University, electrical and computer engineering

Honorable mention:

- *Teresa Chen*, Massachusetts Institute of Technology, electrical engineering and computer science
- *Mauria Finley*, Stanford University, computer science
- *Archra Kalra*, University of Pittsburgh, computer science
- *Svetlana Kryukova*, California Institute of Technology, computer science
- *Amoolya Singh*, Carnegie Mellon University, computer science
- *Susan Thrane*, University of Texas at Arlington, computer science engineering
- *Tina Wong*, University of Washington, computer science
- *Ke Yee Yeung*, University of Waterloo, computer science

Outstanding Male Undergraduate

Winner:

- *Bryan Ford*, University of Utah, computer science

Runners-up:

- *Ian Goldberg*, University of Waterloo, computer science
- *Michael Leventon*, Cornell University, computer science
- *Avrom Pfeffer*, University of California at Berkeley, computer science

Honorable mention:

- *James Clough*, University of Idaho, computer science
- *Joseph Elder*, Temple University, computer and information sciences
- *Stephen Freund*, Stanford University, computer science
- *Steve Gribble*, University of British Columbia, computer science
- *Michael Katchabaw*, University of Western Ontario, computer science
- *Ramon Lawrence*, University of Manitoba, computer science
- *Patrick (Chris) Leger*, Carnegie Mellon University, electrical and computer engineering
- *Quaid Morris*, University of Toronto, computer science
- *Frank Anderson (Andy) Smith*, North Carolina State University, computer science

Special recognition

The Selection Committee decided to make special, one-time recognition of an outstanding nominee: Andris Ambainis from the University of Latvia. Because CRA membership is restricted to North American organizations, the competition is limited to students enrolled in North American institutions. Unfortunately, the competition announcement did not mention this restriction. Ambainis was the only nominee from outside North America but was such an impressive candidate that the committee believed that, in view of the omission in the announcement, it was appropriate to provide special recognition for him. Future competition announcements will clearly indicate the restriction to North American students.

Attention CRA Members

Mailing labels of our membership and the CRA Key Person List are available free to CRA members. The labels are available electronically or on laser labels. The labels are $25 per set for non-members. Contact Phillip Louis at tel. 202-234-2111; fax: 202-667-1066; or E-mail: info@cra.org

Association News

CRA testifies at NSF appropriation hearing

The following is an edited version of oral testimony given by Edward D. Lazowska at an April 5 hearing held by the House Appropriations Subcommittee on Veterans Affairs, HUD and Independent Agencies. Lazowska is a member of the CRA Board and chair of the CRA Government Affairs Committee. He is chair of the Department of Computer Science and Engineering at the University of Washington.

Thank you for the opportunity to testify on the subject of the fiscal 1996 National Science Foundation appropriation.

I'm here to strongly support NSF's appropriation request, particularly the request of $275.57 million for the Computer and Information Science and Engineering (CISE) Directorate. This directorate is responsible for virtually all of the research in computing, information and communications sponsored by NSF, which in turn represents a high proportion of all federally sponsored fundamental research in these areas.

In support of the NSF request, there are six points that I'd like to make:

1) Information technology is economically and socially vital to our society

Information technology, considered alone, is a $500 billion industry.

In addition, information technology has a huge impact on other segments of the economy, such as manufacturing, finance, education, science and engineering.

And "embedded computer systems" are ubiquitous—compact disc players, cellular phones, medical diagnostic equipment such as CAT scanners and so on.

2) The best is potentially yet to come.

The development of the nation's information infrastructure holds the promise of greatly amplifying the already enormous impacts of information technology. It will extend to rural America a number of benefits that urban dwellers take for granted in areas such as health care, libraries, government information, cultural resources and entertainment. The information infrastructure will revolutionize commerce and education.

My teen-age sons already use Internet resources almost daily in their education. For example, within a few weeks of the discovery of Paleolithic cave paintings in France last December, wonderful images and text were available on the World Wide Web. K-12 students across the nation and around the world are consumers of electronic information, and they are publishers of it, too.

The real computer revolution is "the computer as an information access device." This revolution is far bigger than "the computer as a word processor" or "the computer as a spreadsheet engine," and we're poised for it.

3) America's leadership in information technology did not just happen. It is the result of a highly effective, long-term partnership among government, industry and academia.

> *Progress in information technology has been so rapid and so consistent that it is easy to take it for granted. But this would be a huge mistake.*

Progress in information technology has been occurring rapidly in a way never seen before. For several decades, the amount of computation, storage and communication you could buy for a dollar has doubled every 18 to 24 months. This successive doubling—this exponential growth—is the stuff revolutions are made of. Here's a wonderful analogy: If, over the past 30 years, transportation technology had made the same progress as computing technology in size, cost, speed and energy consumption, then an automobile would be the size of a toaster, cost $200, travel 100,000 miles per hour and go 150,000 miles on a gallon of fuel. And in another 18 to 24 months, we'd realize another factor-of-two improvement.

Progress in information technology has been so rapid and so consistent that it is easy to take it for granted. But this would be a huge mistake. It is not as if we're all just sitting around while the speed of electrons doubles every 18 months.

I just spent a year on a congressionally requested 12-person National Research Council committee studying the federal High-Performance Computing and Communications initiative. Our committee devoted a great deal of effort to reviewing the extraordinary partnership among government, industry and academia that has driven this progress in information technology and that has made America the world leader in this critical field. I'd like to strongly encourage this subcommittee to request a staff briefing from the NRC committee co-chairs: Fred Brooks from the University of North Carolina and Ivan Sutherland from Sun Microsystems Inc.

The committee found that federally supported university research played a critical role in essentially every aspect of information technology: time sharing, computer networking, workstations, computer graphics, the "windows and mouse" user interface, database technology, very large-scale integrated circuit design, reduced instruction set computer architectures, I/O subsystems based on redundant arrays of inexpensive disks, parallel computing and others.

Ideas and people move back and forth between academia and industry. New companies are formed, and old companies evolve. Federal support early in the life cycle of ideas advances them from novelties to convincing demonstrations that attract private investment to products and services that add to the quality of life in this country.

4) The industrial sector has not, will not and cannot blaze this trail alone.

I've just addressed the "has not." Let me speak to the "will not" and "cannot."

If you were to watch the television advertisements in Seattle, you'd likely conclude that the technology underlying the nation's information infrastructure sprung forth from the minds of Microsoft Corp. and GTE. Although these companies and others will play critical roles in evolving this technology and bringing it to consumers, the foundations of the technology clearly lie in federally funded research programs that have been transferring ideas and people to the private sector for decades.

I serve on the six-person Technical Advisory Board for Microsoft. I respect the company enormously. Over the past five years, Microsoft discovered that to create new markets, it needed data compression technology, encryption technology, networking technology, 3-D computer graphics technology, modern operating systems technology and statistical decision theory technology, to name a few. It has obtained these technologies from America's research universities.

Even in a rapidly evolving field such as information technology, research takes 15 years to pay off. Companies such as Sun Microsystems and Microsoft did not even exist 15 years ago. The vitality of the information technology industry depends heavily on new companies, but new companies cannot easily afford to do research. Furthermore, industry in general is doing less research now than in the recent past. But because today's sales are based on yesterday's research, investment in innovation must go forward, so the nation's information industry can continue to thrive.

The government-supported research program is critical because it supports the exploratory work that is difficult for industry to afford. It also allows the pursuit of ideas that may lead to success in unexpected ways, and it nourishes the industry of the future, creating jobs and benefits for ourselves and our children.

5) Fundamental research in support of strategic directions is not the same as industrial policy

The purpose of publicly funded research in high-technology fields is to advance knowledge and create new opportunities that industry can exploit in the medium and long term. It is not to determine how the market should develop.

That is what I call "fundamental research in support of strategic directions." It is exactly what the CISE Directorate at NSF does. And it is exactly the right model.

6) A plan for the future exists.

It is nearly impossible to predict where and when the next major breakthrough will occur. However, one can examine objectives and derive ideas of where research investments could be made strategically.

The National Science and Technology Council's Committee on Information and Communications, chaired by Anita Jones, Defense director of research and engineering, and co-chaired by Paul Young, NSF's assistant director for CISE, recently produced a strategic implementation plan. The plan identified six strategic focus areas: global-scale information infrastructure technologies, high-performance/scalable systems, high-confidence systems, virtual environments, user-centered interfaces and tools, and human resources and education.

This multiagency collaborative planning effort seems precisely on target. I'd like to strongly encourage the subcommittee to request a staff briefing from Jones and the co-chairs of the CIC Strategic Plan Development Group, Young and John Toole.

Summary

CRA urges the Subcommittee on Veterans Affairs, HUD and Independent Agencies to give its strongest support to the NSF request.

I understand the extraordinary constraints under which this subcommittee is working.

It is critical, though, to carefully weigh the effect on our future economy of disrupting the investments in research that have proven to provide a critically important foundation for the growth and competitiveness of our $500 billion information technology industry and of the many other industries to which this leadership contributes. We also must carefully weigh the broad benefits to society that will continue to result from the federal research investments that power fundamental advances in information technology.

The federal investment in information technology research through NSF has been incredibly small compared to the payoff.

(Lazowska's full written testimony can be found at http://cra.org)

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Policy News

Congress again considers telecom reform

BY Juan Antonio Osuna
CRA Staff

The Republican-sponsored bill affects the cable industry, online services, long-distance companies and wireless communications providers.

As debate over sweeping telecommunications reform continues, industry parties and lawmakers draw closer to resolution. A Republican-sponsored bill was reported out of full committee in late March with changes designed to win over local phone companies.

Sponsored by Sen. Larry Pressler (R-SD), chair of the Senate Commerce, Science and Transportation Committee, the bill no longer forces the regional Bell operating companies (RBOCs) to wait three years before entering into long-distance and manufacturing markets.

Instead, the bill bestows upon the Federal Communications Commission authority to give the go ahead, based on a complex checklist of criteria outlined in the bill. Once the FCC determines that a local telephone company faces competition for local markets and no longer enjoys monopoly status, it will allow the company to sell long-distance service and manufacture telecommunications equipment.

Other portions of the bill affect the cable industry, online services, long-distance companies and wireless communications providers. The goal of the bill is to spur competition through deregulation that allows these industries to enter each other's markets. Perhaps the most sensitive issue involves the local telephone markets, where the RBOCs now hold monopolies in most areas.

The Alliance for Competitive Communications, a consortium of RBOCs, welcomed most changes over earlier drafts distributed by Pressler and over last year's bill sponsored by Sen. Ernest Hollings (D-SC). However, the consortium did have a few criticisms.

"The latest draft of telecommunications reform legislation released by Sen. Pressler represents a substantial improvement," an alliance statement said.

However, the statement also said, "The checklist RBOCs must meet for entering long distance needs to be less complex and more objective. The bill gives the Federal Communications Commission broad discretion to delay Bell entry into the long-distance market."

Some of these concerns were shared by Sens. Bob Packwood (R-OR) and John McCain (R-AZ), the only two of 19 senators on the committee who voted March 30 against reporting the bill.

In a Senate report, the two senators said: "Under this bill, the long-distance and manufacturing markets will not be fully open until the [FCC] decides that it is in the 'public interest, convenience and necessity' to allow the [RBOCs] to provide long distance and manufacturing

"Whether or not open markets are in the 'public interest, convenience and necessity' can be argued endlessly at the [FCC] and in the courts. Such a delay may benefit competitors, but not consumers," they countered.

The two senators also argued against provisions that give the FCC authority to mandate subsidies for universal telecommunications services. The bill's "universal service" provision requires telecommunications providers to make minimal, affordable service available to everyone.

"We support the goals of affordability and universality for necessary telecommunications services," Packwood and McCain said. "However, it is unwise to grant any agency such an open-ended mandate."

The most controversial aspect of the universal service provision was a section requiring telecommunications companies to provide service at "incremental cost" to schools, health care providers and libraries. This provision was incorporated as an amendment, sponsored by Sens. Jay Rockefeller (D-WV), James Exon (D-NE) and John Kerry (D-MA).

As for this amendment, Sen. Conrad Burns (R-MT) took aim at Planned Parenthood, the country's largest provider of birth control and abortion services. Alluding to the potential eligibility of Planned Parenthood to receive preferential rates for telecommunications services, Burns said, "I am afraid the Senate is being inadvertently drawn into an area of high controversy which I, for one, believe we should avoid."

Burns also criticized the notion of preferential rates, saying such a system "buries much of the cost of providing telecommunications service to our health and educational systems in the telephone rates all Americans pay."

Although the current universal service provisions are narrower than those in last year's bill, sources said Pressler's bill may still encounter hurdles on the Senate floor. The bill may not reach the floor until June.

One section of the bill that encountered no controversy within the full committee markup was Sen. James Exon's (D-NE) amendment to clean up obscenity on the Internet. However, this addition has enraged civil liberties groups and many Internet users, who have called for a full-scale war to stop what they see as an attack on First Amendment rights.
(See Page 1.)

Republicans propose Science Department

BY Juan Antonio Osuna
CRA Staff

Congress has been kicking around the idea of a Department of Science since 1884, with the idea having been proposed dozens of times in the last few decades.

Recent changes in the political climate have rekindled the debate with fervor, as some members of Congress see the proposal as an opportunity for big savings by consolidating and downsizing various smaller agencies into one cabinet-level department.

The current champion of this idea is Rep. Robert Walker (R-PA). Although he sponsored legislation in previous Congresses to establish such a department, the legislation never went far under a Democratic majority. Now Walker serves as chair of the House Committee on Science and vice chair of the Budget Committee and is positioned as a key player in defining the overall budget picture for R&D.

His new proposal, which at press time was in the form of a discussion draft, has drawn interest among Republicans as a way to reduce federal spending. Democrats fear it is nothing more than an irresponsible attempt to slash and burn the federal R&D budget.

The most frequently mentioned candidates for consolidation are the departments of Energy, Commerce, and Housing and Urban Development, the National Science Foundation, NASA, the Office of Energy Research and the Environmental Protection Agency

Other Republican leaders have advocated even more radical changes. Senate Majority Leader Robert Dole (R-KS) has suggested dismantling the Education Department; and a bill to merge that department with the Labor Department has been introduced in the House.

Congressional politics preclude incorporating the National Institutes of Health, the Defense Department's research units or the Agriculture Department into a Science Department, as these represent vast sectors of the budget and both parties' political agendas.

Not surprisingly, the consolidation issue was a hot topic at this year's Colloquium on Science and Technology Policy, sponsored by the American Association for the Advancement of Science. Barry Beringer, chief counsel for the House Science Committee, and John Gibbons, the president's chief science adviser, offered strong opinions on the subject.

"People look at me as the executioner," Beringer half-jokingly told a mostly scientific audience.

While Beringer admitted that Walker has sold the plan to fellow Republicans as a way of "eliminating" vast bureaucracies and making government more efficient, he insisted that the plan was a cool-headed way of making the best of inevitable cuts yet to come.

"I would like you to maintain an open mind on this," Beringer said. "[Walker] looks at this as an opportunity to create the department of the future.

"We will put everything on the table. We're not locked into one particular structure," he said, adding that the committee would hold hearings and encourage debate over how to best implement such an overhaul.

However, the Clinton administration opposes the proposal. "This administration unequivocally opposes the creation of a Department of Science of the kind now being discussed in Congress," science adviser Gibbons said at the colloquium.

He argued against the proposal on the philosophical grounds that multiple agencies nurture healthy diversity and independence.

"The genius of US science policy to date has been its recognition that pluralism of support and diversity of performers allow the crucial freedom of inquiry that unleashes the creative spirit of our world-class researchers and their students," Gibbons said. "The proposal to create a Department of Science flies in the face of this pluralism by instituting a command-and-control model of rigid bureaucracy

"If the Congress truly wants a leaner, more efficient federal S&T system—not just cosmetic surgery—it need not look far for a model," Gibbons said. "Under the president's 'Reinventing Government' initiatives, we have already pared more than 100,000 jobs from the federal bureaucracy. That'll total nearly 150,000 before we're finished."

Policy News

NSF initiates program targeting junior faculty

By Gerald L. Engel

The National Science Foundation initiated the Faculty Early Career Development (CAREER) program in 1995. The purpose of this NSF-wide program is to "strongly encourage the early development of academic faculty as both educators and researchers."

The program replaced the NSF Young Investigator program, the Minority Research Initiation program and the Research Initiation Award program of the Computer and Information Science and Engineering Directorate and the Engineering Directorate. The CAREER program is open to "junior faculty who intend to develop academic careers involving both research and education."

The deadline for the CAREER program varies by discipline. This year's CISE deadline is expected to be sometime in the fall. Awards come out of the individual programs within NSF. For more information, contact the officer for the program that best fits the proposal. (See the NSF federal funding chart on pages 6-7 for help in locating the appropriate CISE program officer).

Because the program was designed to address the research and education aspects of an investigator's developing career, the program announcement (NSF 94-101 (New)) required a Career Development Plan consisting of a) a research plan, b) an education plan and c) a departmental endorsement. The entire plan was not to exceed 15 single spaced pages.

Research Plan: The research plan should have no more than 10 single-spaced pages. It should have followed the standard NSF proposal format, and it should have presented:

- The objectives and significance of the proposed research.
- The relation of the research to the current state of knowledge in the field.
- An outline of the general plan of work, including a description of the methods and procedures to be used.
- A summary of prior research accomplishments.
- A brief description of the impact of the proposed research (refer to GPG, Section 11.C.12.d) for proposals submitted to the Directorate for Engineering

One hundred thirty-six proposals were submitted to the six programs (Theory of Computing; Software Engineering; Numeric, Symbolic and Geometric Computation; Computer Systems; Operating Systems and Systems Software; and Programming Languages and Compilers) of the Division of Computer and Computation Research (CCR). Of these proposals, 81, or about 60%, had research plans that were 10 pages or longer—seven exceeded the page limit. The average length of the plans was 9.32 pages. And the plans, on average, contained 42.46 references to the research literature.

By way of contrast, the education plan was much more specific, perhaps anticipating some significant confusion regarding this aspect of

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NII grant programs cut

By Juan Antonio Osuna
CRA Staff

A program to connect schools, libraries, researchers and health care providers to the National Information Infrastructure was among the civilian programs cut to pay for an emergency military-spending package.

President Clinton signed a $3.1 billion measure April 10 to replenish Pentagon coffers drained by peace-keeping missions in Haiti, Somalia, Rwanda and elsewhere. The administration requested the measure because funding shortages endangered accounts reserved for military training and equipment maintenance.

To pay for these emergency funds, the package trims funds from other sectors of the Defense budget and from civilian agencies, including the Commerce Department's National Institute of Standards and Technology and the National Technical Information Administration.

Among fiscal 1995 rescissions were $15 million from NTIA's National Information Infrastructure Grant program and $90 million from NIST's Advanced Technology Program. Of the $64 million already appropriated for 1995 information infrastructure grants, $15 million must be returned.

Other legislation—HR 1158 in the House and S 617 in the Senate—threatens to obliterate remaining funds for the NII program. At press time these bills were in conference, where the House and Senate will iron out differences between the two versions. The House version contains a $30 million cut from the NII program.

However, a congressional staffer said conferees may modify this figure to reflect rescissions already contained in the military measure and actual funds remaining in the program's fiscal 1995 account. In other words, Congress cannot take back funds already spent.

Additional cuts could obliterate remaining funds and effectively cut the program in half. A House Appropriations Committee report (H Rept. 104-70) justifies these cuts by saying:

"Many of the projects funded in the initial round of grant awards did not correspond with the committee's understanding of the program. The committee has proposed this reduction to slow the rate of growth in this program and allow for a more thorough evaluation of the program's goals as well as dialogue with the administration and the appropriate authorizing committees on the continuation of the program."

Also contained in HR 1158 is a $132 million bite out of the National Science Foundation's Academic

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Maryland is first state to tackle NII privacy issue

Revelations last year that America Online and other online service providers were selling subscriber information to direct marketers prompted the Maryland House of Delegates to hold a hearing on the issue in March.

The Maryland House of Delegates held the landmark hearing on SB 524, a bill to protect subscriber privacy rights, signifying the first time a state legislature has tackled such an issue.

Last year, advertisements appeared in direct-marketing magazines offering to sell online subscriber profiles. Soon after, newspaper reports led to the controversy.

The Maryland bill requires that an "online computer service may not disclose personal information concerning a subscriber to any other person unless the subscriber…has received notice…and consented to the disclosure."

Consent may be provided electronically or in writing and requires that customers be told what information is being collected, how it is being used and how they can access their records.

Opposing the bill were representatives from AOL, AT&T, Sprint, MCI and the Direct Marketing Association. Online service providers urged the state legislature to wait until the issue is addressed at a national level, whereas DMA more strongly opposed the bill.

Funding agencies from Page 7

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Obscene from Page 1

the right to dial sexually oriented 900 numbers, as long as telephone companies also provide parents with 900 number blocking capability

In other arenas such as video or print media, a multitude of city, county, state and federal laws have evolved within constitutional boundaries set forth by the Supreme Court over the years. The boundaries between free expression and obscenity are usually defined by local community standards.

Some legal experts say transposing telephone law into the frenzied world of digital communications would throw the courts into a constitutional quagmire.

How do we apply geographically based obscenity standards to global networks? Should we allow a prosecutor in a rural, conservative county to restrict the free flow of information on bulletin board systems in an urban area, where people may have different attitudes toward such topics as homosexuality?

Should a particular newsgroup or online service constitute a virtual community and be allowed to set its own standards? How do we codify standards belonging to a virtual community? How do we spot violations of these standards? Do we trust a computer program to police the network? How do we catch the "indecent" message senders when they can remain anony-

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Canadian News

Science funding in Canada cut sharply

BY Douglas Powell

For the first time in more than a decade, science funding in Canada has been significantly curtailed, with cuts of at least 15% over the next three years and possibly more to come.

"We will be putting government activities on a commercial basis wherever that is practical and productive," Finance Minister Paul Martin said when presenting his budget to the House of Commons in late February. "In the future, our science and technology efforts will be concentrated more strategically on activities that foster innovation, rapid commercialization and value-added production…to stretch government's science dollars further and more effectively."

Computing research emerged largely intact, as only sciences that can be translated into employment, particularly applied research, will be favored. According to Industry Canada, revenues for the information technology sector in Canada increased from $43 billion (Canadian) in 1992 to $49.5 billion in 1993. The industry employs 343,000 people, up from 317,000 a year earlier.

IDC Canada, a Toronto-based market research company, pegs the value of the Canadian IT sector at $19 billion, including computer hardware, telecommunications equipment, and packaged software and services. The much larger Industry Canada figure includes consumer electronics, office equipment and electronic components. Still, using the conservative IDC numbers, the Canadian IT sector grew by 6.7% in 1994.

For a government mired in debt, those numbers are welcome news. Within government departments, science activities were reshaped with a series of cutbacks, the introduction of user fees and a move toward industrially oriented research. Of the 54 programs administered by Industry Canada, nine have been terminated,

> *The budget includes spending cuts of $13.4 billion over two years and the elimination of 45,000 civil service jobs.*

including scholarships and technology outreach programs, and 34 will not be renewed. Only 11 will continue, including Canada's venture on the information highway, the Canadian Network for the Advancement of Research, Industry and Education (CANARIE).

Providing a "vision"

Two days after the budget was presented, Junior Science Minister Jon Gerrard said at the annual meeting of the Information Technology Association of Canada, "First and foremost, our federal government must provide a vision. In the area of information technology, we have provided a vision of a more open society in which we build on Canadian strengths to improve employment and innovation, to improve Canadian content and culture and to ensure universal access to Canadians at a reasonable cost."

Indicative of the jobs-from-science mantra sweeping Ottawa, Gerrard said CANARIE will generate new jobs and investment far in excess of the federal government's contribution. "The estimated incremental sales resulting from CANARIE R&D activity are $2.3 billion over a period of about 25 years. The incremental employment over the 10-year period from 1993-2002, directly attributable to CANARIE, is some 24,000 person years," he said.

Gerrard did not discuss the source of these numbers. Annual increases of 1.5% for university granting agencies, which were promised in last year's budget, are gone. Instead, the Natural Sciences and Engineering Research Council (NSERC) and the Social Sciences and Humanities Research Council (SSHRC) are facing 13% and 12% reductions respectively by 1997-98.

The Medical Research Council is facing a 12% shortfall. The cut will translate into fewer grants and stipends for research and training and a reduction in research infrastructure support. An MRC spokesperson said, "We're already funding the cream of the cream."

Within the National Research Council, which is a network of government laboratories, reductions will total 15% by 1997-98. When coupled with previously planned reductions, the cuts total $76 million, with $40 million gone this year.

"I'm disappointed. We certainly take a hit," said NRC President Arthur Carty. "With limited resources you just can't afford to spread yourself too thin."

The cuts to NSERC, SSHRC, the Canadian Space Agency and the National Research Council total $321 million over three years, a 23.6% decrease from 1994-95 expenditures. The good news is that, relatively speaking, these cuts are small.

Budget of restraint

Canada boasts the worst debt load in the Group of Seven industrialized nations, except for Italy, when measured against gross domestic product. The weakened Canadian dollar (trading at about $0.71 US) and a runaway national debt now totaling $500 billion forced Martin to create a budget of restraint. The budget includes spending cuts of $13.4 billion over two years and the elimination of 45,000 civil service jobs, about 15% of the government payroll.

The impact of the science cuts on specific programs is unclear. Federal S&T activities, totaling $5.8 billion in 1994-95, are spread over 18 departments. A 1994 report by the auditor-general of Canada was extremely critical of the federal government's overall science strategy, calling the present allocation of funds among various fields of science and technology "more incidental than the result of a well-formulated strategy."

In response, last year the government launched a major review of federal spending on science and technology involving consultation across the country and an internal department-by-department review. The results are expected in June.

"There hasn't been a science strategy for 30 years," said Bill Milliken, a spokesman for Industry Canada. While acknowledging the interdepartmental turf wars that have blocked such attempts in the past, he added that "a shortage of funds tends to focus things."

Martin's budget also takes aim at the $1 billion spent annually on R&D tax credits—especially the popular practice of claiming credits for upgrades to computer software and hardware—by tightening eligibility and launching a review of the entire system.

Banks and other financial institutions, including investment dealers, will not be able to collect federal R&D tax credits during this review. Last fall it was revealed that Canada's largest banks had filed $300 million in claims for R&D tax credits dating back to the mid-1980s, some for long-completed computer software upgrades. Banks had been eligible for a credit of 20% on their R&D expenditures.

Douglas Powell is a graduate student at the University of Guelph in Ontario.

NSF from Page 9

the proposal.

Education Plan: The education plan should not have exceeded five single-spaced pages. It should have addressed the applicant's planned education activities over the proposed award period as appropriate to the development of a full, balanced academic career and described the applicant's education accomplishments. It should have included:

- The objectives and significance of the proposed education activities in relation to the applicant's career goals and the goals of the institution.
- A summary discussion of the education activities the applicant plans to undertake.
- A discussion of the types of teaching activities the applicant plans to undertake during the award period or a statement of equivalent planned educational responsibilities. (Teaching assignments, if known, may have been included.)
- A summary of teaching and other education accomplishments.

In addition, some administrative details (the effective date of the applicant's initial full-time tenure-track or equivalent appointment) and a statement endorsing the proposal by the administrator responsible for the program were to be included in the plan. These items typically took half of a page.

The CCR review panel expressed some significant concerns regarding the nature of the education plan. While agreeing with the concept of conveying the importance of teaching, there was concern that not enough thought had gone into the implementation in this particular program. It was noted, for example, that a new assistant professor has rather limited latitude in program development. It also was noted that although the proposers have records of accomplishment in research that can be evaluated, they have relatively little experience in teaching. Therefore, the metrics to use are far from clear.

Looking more objectively at the education plans, the average plan was about 3.33 pages. About 14% of the plans were five pages. The education plans averaged 1.18 references. And 98 proposals (72%) had no references. Only six of the education plans (4%) included some concept of evaluation.

The typical plan cited some success as a teaching assistant, a desire to introduce a new course in the area of specialty and a desire to involve undergraduates—often from underrepresented populations—in the proposer's research activity. Although all of these are commendable goals, such a description is difficult to classify as a plan, especially when there is no reference to the literature of computer science and engineering education and no concept of evaluation of the results.

If we are to be successful in conveying the view of the importance of teaching in the career development of young faculty, additional work will be required both inside and outside NSF. There is a rich literature in computer science and engineering education, and this needs to be conveyed to our graduate students and recent graduates. There is also a growing literature of effective methods of project evaluation—for example, *NSF 93-152: User-Friendly Handbook for Project Evaluation: Science, Mathematics, Engineering and Technology Education*. The importance of approaching education with the same sense of inquiry, quality and scholarship with which research is approached must become a priority.

Gerald L. Engel is program director for special projects in NSF's Division of Computer and Computation Research. He is on assignment from the Leonhardt Chair of Computer Science and Engineering at the University of Connecticut at Stamford.

Professional Opportunities

CRN Advertising Policy

Send copy and payment for Professional Opportunities advertisements to Advertising Coordinator, *Computing Research News*, 1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009. Tel. 202-234-2111; fax: 202-667-1066; E-mail: jbass@cra.org. E-mail submissions are preferred.

The format of an ad must conform to the following: 1) the first line must contain the name of the university or organization and will be printed in bold, 2) the second line must contain the name of the department or unit and will be printed in italics and 3) the body of the ad should be in paragraph form. The words in the first two lines are included in the total word count for the ad. You may request in writing that some headings or text be set in bold; a word set in bold will count as two.

The rate is $2 (US) per word. Purchase orders, money orders and checks are acceptable *(please do not send cash)*. All CRA members receive at least 200 free words per dues year. Advertisers may also request that their Professional Opportunities ads be posted to CRA's jobs@cra.org mailing list. This service is free to our advertisers.

Professional Opportunities display ads cost $30 (US) per column inch. Ads must be submitted in camera-ready, offset (positives or negatives) or mechanical form. Please call for information on placing display ads for products or services.

Computing Research News is published five times per year: in January, March, May, September and November. Professional Opportunities ads with application deadlines falling within the month of publication will not be accepted unless the ad says applications will be accepted until the position is filled. Advertising copy must be received at least one month before publication. The deadline for the September issue is August 1.

University of Notre Dame
Department of Computer Science and Engineering

The Department of Computer Science and Engineering at the University of Notre Dame invites applications for a tenure-track faculty position at the assistant professor level. Applicants should have a doctorate in computer science, computer engineering, electrical engineering or a related field.

Research areas of particular interest within the department are parallel and distributed computing, including parallel languages/compilers, parallel architectures, high-performance computing and parallel algorithms, and VLSI. Applicants should have abilities and interests in teaching at the undergraduate and graduate levels, advising students and conducting research. Salary is negotiable.

Interested persons should forward a complete resume, together with the names, addresses and telephone numbers of at least three references, to Dr. Steven C. Bass, Chair, Department of Computer Science and Engineering, University of Notre Dame, Notre Dame, IN 46556. E-mail: bass@cse.nd.edu. Resumes sent via e-mail to the above address are welcomed. These should be in plain ASCII form.

The University of Notre Dame is an affirmative action, equal opportunity employer

Concordia University
Department of Computer Science

Applications are invited for several limited-term appointments for the academic year 1995-96. The duties will consist of the teaching of five one-semester courses over the period of one year. Applicants should have a Ph.D. in computer science or in a related field.

Concordia University is located in downtown Montreal. The department has approximately 700 undergraduates, more than 200 graduate students and 28 full-time faculty members. The department has good teaching and research laboratories that are supported by a strong team of analysts and technicians.

The department's principal research interests are artificial intelligence, combinatorics, computer algebra, databases, distributed computing, pattern recognition, programming languages, scientific computing, software engineering and VLSI. It has established CENPARMI (the Center for Pattern Recognition and Machine Intelligence), and it is an active participant in two inter-university centers, namely CICMA (Centre Interuniversitaire en Calcul Mathematique Algebrique) and GRICAO (Groupe de Recherche Interuniversitaire en Architecture de Haute Performance et VLSI).

Interested persons should send a resume and the names of at least three referees to Chair, Department of Computer Science, Concordia University, 1455 de Maisonneuve Blvd. West, Montreal, Quebec, Canada H3G 1M8. Fax: 514-848-2830; E-mail hiring@cs.concordia.ca.

Concordia is committed to employment equity and encourages applications from women, aboriginal peoples, visible minorities and disabled persons. All other things being equal, priority will be given to female applicants.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Cornell University
Department of Computer Science

The Department of Computer Science announces an opening for an assistant professor. This is a three-year, non-tenure track teaching position beginning August 1995. The successful candidate will teach introductory computer science courses, assist in coordinating and teaching in the Master of Engineering program as well as participate in the activities of a top-rated computer science department dedicated to quality teaching and research.

Minimum qualifications include a Ph.D. in computer science and substantial teaching experience. Demonstrated commitment to teaching is essential. In addition to outstanding qualifications as a teacher, candidates should be interested in the research programs already active at Cornell.

Applicants should submit a curriculum vitae and the names of at least three references to Search Committee Re: NTT/AP, Department of Computer Science, 4126b Upson Hall, Cornell University, Ithaca, NY 14853-7501. Cornell University is an equal opportunity employer and welcomes applications from women and ethnic minorities.

Note: Candidates who have previously submitted application materials to the department need only send a letter expressing interest in the position.

Oregon Graduate Institute
Department of Computer Science and Engineering

The Department of Computer Science and Engineering seeks to recruit a new faculty member with strong research credentials. Applications are particularly solicited from candidates with research interests in networking and multimedia systems.

OGI is an independent graduate school with no undergraduate programs. Teaching loads are light, but the quality of teaching is valued highly

Applicants must have prior faculty or postdoctoral research experience. Candidates who are anticipating completion of a Ph.D. are encouraged to apply for postdoctoral positions in the department.

The department currently has 19 full-time faculty and 50 doctoral students. Active research areas include formal methods for software engineering, data-intensive systems, distributed and parallel computing, spoken language understanding, compiling for high-performance computers, artificial neural networks and human-computer communication.

To apply, send a brief description of research interests, the names of at least three references and a resume with a list of publications to Professor Andrew Black, Department Head, Department of Computer Science and Engineering, Oregon Graduate Institute of Science and Technology, PO Box 91000, Portland, OR 97291-1000. E-mail: csedept@cse.ogi.edu.

OGI is an equal opportunity employer and particularly welcomes applications from women and minority candidates. Appointment is subject to the availability of funding

Johns Hopkins University
Department of Computer Science and Center for Language and Speech Processing

The Johns Hopkins University invites applications for a new faculty position at the level of assistant professor in the Department of Computer Science, in conjunction with the Center for Language and Speech Processing of the G.W.C. Whiting School of Engineering.

We are particularly interested in candidates with research interests in an experimental area of natural language and speech processing, such as machine learning techniques applied to language processing, statistical language processing and modeling discourse and dialogue, machine translation, spoken language systems and information retrieval. The ability and desire to participate in collaborative projects is essential. In addition, candidates should have teaching interests in more general areas of natural language processing and computer science, such as statistical modeling, data compression or cryptography

This will be a tenure-track position in the Department of Computer Science, which will include significant collaborative research opportunities with the multidisciplinary Center for Language and Speech Processing

All applicants are expected to have an outstanding research record, commitment to quality teaching and the ability and willingness to develop a research program of the highest quality. Applicants should send a comprehensive curriculum vitae, statement of research interests and the names of at least three references via E-mail. Send plain text, Postscript or self-contained LaTeX files to faculty_search_nlp@cs.jhu.edu.

The Johns Hopkins University is an equal opportunity, affirmative action employer. Minorities and women are strongly encouraged to apply

University of Western Ontario
Department of Computer Science

The Department of Computer Science at the University of Western Ontario invites applications for a research associate. Candidates should have, or be near completion of, a Ph.D. in computer science and have expertise in distributed systems. Preference will be given to those with experience in the areas of applications, systems and network management, distributed directories and heterogeneous computing environments. The position is part of a project in the Department of Computer Science funded by an NSERC Cooperative Research Development Grant and IBM. The primary focus of the research is to address fundamental problems and interdisciplinary issues arising in the management of distributed applications and services. There also will be substantial interaction with project participants at other Canadian universities and other IBM laboratories on related issues. The successful candidate will be expected to interact with faculty and graduate students, conduct seminars and assist in publishing results. Funding is guaranteed for two years, and there is the possibility of an extension.

The deadline for applications is May 31, 1995. The effective date of appointment is Sept. 1, 1995. Applications should be sent to Dr. Michael Bauer, Principal Investigator, Department of Computer Science, University of Western Ontario, Middlesex College, London, Ontario, Canada N6A 5B7. E-mail: bauer@csd.uwo.ca.

Preference will be given to Canadian citizens and permanent residents of Canada. The University of Western Ontario is committed to employment equity, welcomes diversity in the workplace and encourages applications from all qualified individuals including women, members of visible minorities, aboriginal persons and persons with disabilities.

University of Western Ontario
Department of Computer Science

The Department of Computer Science at the University of Western Ontario invites applications for a tenure-track position at the level of assistant professor. Candidates should have a Ph.D. in computer science or related discipline and show evidence of strong research potential and excellence in teaching. Preference will be given to candidates with research interests in software engineering, network communications, distributed computing and related fields.

The Department of Computer Science comprises 20 regular faculty plus visiting and teaching faculty members. The department offers B.Sc., M.Sc. and Ph.D. degrees in computer science and maintains an in-house, state-of-the-art computing environment consisting of well over 50 workstations with specialized research facilities for graphics, parallel computing and distributed computing

The department receives funding from NSERC, ITRC, IRIS, industry and government agencies, such as the Canadian Genome Analysis and Technology Program and Agriculture Canada, for research into a broad range of areas, including algorithms, artificial intelligence, computer graphics, databases, distributed computing, formal languages and automata, image processing, medical imaging, numerical analysis, parallel algorithms and computation, programming languages, software engineering and vision.

The University of Western Ontario, located in London, Ontario, offers an attractive campus with many activities. London offers a reasonable cost of living coupled with many of the amenities found in larger cities as well as convenient access to the metropolitan areas of Toronto and Windsor/Detroit.

The deadline for applications is Nov. 15, 1995. The effective date of appointment is Jan. 1, 1996. Applications should be sent to Dr. Michael Bauer, Chair, Department of Computer Science, University of Western Ontario, Middlesex College, London, Ontario, Canada N6A 5B7.

Positions are subject to budget approval. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. The University of Western Ontario is committed to employment equity, welcomes diversity in the workplace and encourages applications from all qualified individuals including women, members of visible minorities, aboriginal persons and persons with disabilities.

University of Illinois, Urbana-Champaign
Department of Electrical and Computer Engineering

The University of Illinois at Urbana-Champaign's Department of Electrical and Computer Engineering anticipates possible tenure and tenure-track faculty appointments in computer engineering. Applicants must have outstanding academic credentials and an ability to teach effectively at both the graduate and undergraduate levels. Selected candidates will be expected to initiate and carry out independent research and perform academic duties associated with our B.S., M.S. and Ph.D. programs.

A Ph.D. is required. Salary is open and based on qualifications. The starting date is negotiable. Applications must be received by May 15, 1995, to receive full consideration.

Send a resume, including at least three references, to T.N. Trick, Head, Department of Electrical and Computer Engineering, 1406 West Green St., Urbana, IL 61801. Tel. 217-244-0968.

The University of Illinois at Urbana-Champaign is an affirmative action, equal opportunity employer

Conference News

EFFECTIVE TEACHING IN CS&E ✦ JUNE 8-9 ✦ SNOWBIRD, UTAH

As part of its workshop series, the Computing Research Association is sponsoring Effective Teaching in Computer Science and Engineering. The workshop is intended for new faculty members teaching college and university courses in computer science and engineering. However, if space is available, experienced faculty are welcome to attend.

The purpose of the workshop is to help new faculty members teach more effectively. This highly interactive workshop includes theoretical material on educational objectives and learning styles, and practical tips on effective lecturing, course organization, creative problem solving and collaborative learning.

Attendees are asked to bring a syllabus and examination from one of their courses. Attendees will actively participate individually, in pairs and in small groups. Each person will receive a booklet of readings and a bibliography on effective college teaching. The workshop leaders are Michael C. Loui, professor of electrical and computer engineering, University of Illinois at Urbana-Champaign; and Michael Baulsen, associate professor of educational leadership, University of New Orleans.

For more information about the workshop, contact Kimberly Peaks of CRA at tel. 202-234-2111 or via Email at kpeaks@cra.org. Space is limited.

Preliminary Agenda

Thursday, June 8

Breakfast 7:30AM–8:30AM
Registration 8:30AM–8:45AM

Session 1 8:45AM–10:30AM
Learning Styles
This session will begin with a brief introduction to the workshop and a brainstorming exercise on the characteristics of good teaching, generated by the participants.

The Gregorc model of learning styles will be presented. Instructors should use a variety of styles so they can reach all students. For example, factual information should be presented verbally and visually because some students prefer words, and others prefer pictures.

Activities: Participants will use the Gregorc style delineator to determine their own preferred learning styles. They will share their findings to show the diversity of learning styles among themselves.

Morning Break 10:30AM–10:45AM

Session 2 10:45AM–12:30PM
Effective Lecturing
Every aspect of a lecture should promote either motivation or cognition. Motivation strategies include gaining attention, showing relevance to students' interests, increasing students' confidence in their ability to learn and giving feedback on students' performance. Cognition strategies include rehearsal and repetition, elaboration and rephrasing, organization and metacognition, in which students monitor their own progress.

Activities: Participants will observe a 20-minute model lecture and identify the motivation and cognition strategies that were used.

Luncheon 12:30PM–2:00PM

Session 3 2:00PM–3:45PM
Creative Problem Solving in Groups
Most computer science courses emphasize technical problem solving but rarely teach problem solving skills per se. Participants will learn how to make the process of solving problems explicit using the IDEAL model. In addition, participants will learn how to foster students' creativity in devising solutions to problems and how to incorporate collaborative learning into the classroom.

Activities: Participants will be assigned to groups of three or four to balance their levels of experience and their backgrounds. All groups will consider the same pedagogical problem in computer science for part of the time and their own problems for the remainder. Answers to the common problem will be shared with the full group.

Dinner 6:00PM–7:30PM

Friday, June 9

Breakfast 7:30AM–8:30AM

Session 4 8:30AM–10:15AM
Course Organization and Instructional Objectives
Bloom's taxonomy of educational objectives will be presented. Participants will learn how to write instructional objectives for a particular assignment and for an entire course.

Activities: Participants will write six questions on the same concept at different levels of Bloom's taxonomy, analyze their examination according to the levels, and critique each other's syllabi.

Morning Break 10:15AM–10:30AM

Session 5 10:30AM–11:30AM
Advising Thesis Students (tentative)
(This session is still being formulated.) Because participants will come from Ph.D.-granting departments, they will be expected to supervise research projects by undergraduate and graduate students. This session will focus on techniques for individual instruction and on research ethics, including authorship questions and conflicts of interest.

Session 6 11:30AM–Noon
Evaluation for Improvement
Participants will learn how to use informal early feedback after the first or major assignment.

Evaluation of the workshop.

Luncheon Noon–1:30PM

Registration Information

The registration fees for the workshop are as follows:

	By April 28	After April 28
CRA members	$350	$400
Non-members	$450	$500

The conference hotel is the Cliff Lodge at Snowbird Ski & Summer Resort. All hotel accommodations must be arranged through the Computing Research Association. Snowbird Resort will not accept direct reservations.

The following room rates (effective June 5-11) include all conference meals:

Bedroom	$85/night
Deluxe Bedroom	$131/night
One-bedroom suite	$216/night

Rate does not include current 9.63% state room tax.

Cuts from Page 9

Research Infrastructure account.

"The FY 1996 budget did not include continuation of this effort as required by the FY 1995 appropriation, and the amount recommended for rescission is the same as proposed by the president in the February 6, 1995, messages," the House report said.

Also cut was funding for the Commerce Department's National Technical Information Service, which was given a one-time capitalization of about $8 million for 1995. These funds were intended to help NTIS disseminate more federal information electronically to the public, particularly through federal depository libraries and government-operated bulletin boards and Internet sites.

The House bill cuts $4 million, thus chopping NTIS's funds in half. The committee report said it feels that most of these modernization costs can be absorbed through fees paid by users of this technical information."

Finally, while the House bill contains $1.6 billion in cuts to the Education Department, the Senate version only cuts $600 million. These differences will be reconciled in conference.

Obscene from Page 9

mous or use encryption?

The bill's greatest weakness lies in the many unanswered questions it raises. To some extent, Exon recognizes that there is room for debate and has urged his opponents to come to the negotiating table.

During a CNN debate with EPIC's Rotenberg, Exon said: "I agree with you, Marc. [New technology] poses new opportunities, new challenges and also new dangers. That's the part that I'm trying to address. I certainly like your attitude. I say come together. Let's talk. And maybe we can work out something that is agreeable to all and stop smut and pornography from overpowering this new system."

As it stands, the bill may run into some trouble, especially with both House Speaker Newt Gingrich (R-GA) and Sen. Patrick Leahy (D-VT) joining the chorus of voices opposing the bill, including more than 100,000 signers of an Internet petition.

Although the bill faces substantial opposition, the full committee's unanimous support to attach the legislation to the sweeping telecommunications package suggests lawmakers are eager to attack the problem. A bit of fine-tuning could bring many opponents around.