COMPUTING RESEARCH NEWS

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Congress revamping communications law

By Juan Antonio Osuna
CRA Staff

The Senate and House are working vigorously with the Clinton administration on legislation that would revamp communications law.

"This legislation represents the most comprehensive revision of the Communications Act of 1934 since it was passed 60 years ago," Sen. Larry Pressler (R-SD) said at a hearing on the Communications Act of 1994 (S 1822) before the Senate Commerce, Science and Transportation Committee.

The Senate has held three hearings on the legislation this year while the House has held seven hearings and two markups on similar legislation—the National Communications Competition and Information Infrastructure Act of 1994 (HR 3636) and the Antitrust Reform Act of 1994 (HR 3626).

The Senate bill remains at the subcommittee level. In March the House bills were amended and ordered to be reported by the Energy and Commerce Committee.

While details vary, these pieces of legislation, when combined, would promote open access to common carriers on a non-discriminatory basis and ensure interoperability of standards and protocols. The legislation would ensure that carriers provide consumers in rural and non-competitive markets access to high-quality network facilities at reasonable, non-discriminatory rates.

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>
> —Sen. Larry Pressler

The legislation would promote universal service and require preferential rates for educational and health care institutions, state and local governments, public broadcast stations, libraries, community newspapers and other public entities.

The legislation would allow local telephone and cellular companies to provide long-distance service, under certain restrictions, thus superseding the Modification of Final Judgment entered into Aug. 24, 1982. After a specified date, the legislation would preempt state restrictions on what types of companies can provide telecommunications services.

Electric, gas, water and steam utilities would be allowed to provide telecommunications services. Bell operating companies, through affiliates, would be authorized to manufacture telecommunications and customer-premises equipment.

Local telephone companies, through affiliates or joint ventures, would be allowed to provide electronic publishing under certain restrictions. Telephone companies also would be allowed to provide video programming services, but cross-ownership of cable and telephone companies would be prohibited.

The legislation prohibits cross-subsidization of costs between basic telephone services and other services such as video programming, and prohibits common carriers from releasing or otherwise abusing customer proprietary information.

The Federal Communications Commission would be required to study privacy issues, suggest legislation and develop regulations in response to privacy concerns. The FCC would have the broad authority to fill in regulatory details and enforce compliance among common carriers.

Newly created joint state and federal boards would make recommendations to the FCC on issues such as universal service.

In a broad sense, the House and Senate bills conform to one another and to the Clinton administration's proposals. However, there has been some debate, and details have changed.

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Are we producing too many Ph.D.s?

BY Ashok K. Chandra, David A. Patterson, Joseph Traub and Paul Young

Computer science and engineering is continuing its dynamic growth as a discipline, and so is the rate of production of S&E Ph.D.s. Although some Ph.D.s receive several job offers, many appear ill-prepared for the realities of the market. Students are finding that university jobs are hard to come by; the role of postdoctoral positions is increasing; the base of computing research is no longer rapidly broadening to a larger set of universities; and industry, while continuing to provide jobs, does so with a changing mix of requirements.

How should the field step up to its obligation to inform students of job prospects? What should we teach in order to prepare our students for a research career? What advice, if any, can we give to government agencies to encourage funding patterns that serve national goals of economic prosperity? What information can we collect about our field in a systematic way that will shed light on these issues and augment the CRA Taulbee Survey on the Production and Employment of Ph.D.s and Faculty in Computer Science and Engineering? These questions will be discussed at the CRA Conference at Snowbird '94 this July with the aim of helping forge a view of what our field should do about these issues.

Environment

The number of Ph.D.s granted in computer science and engineering in North America has quadrupled from about 250 10 years ago to more than 1,100 in 1991-92. (There was a slight decline in 1992-93.) This number already is much greater than the number of mathematics Ph.D.s produced annually though not quite up to the number for physics (1,346 in 1992). The size of the field and the rate of increase have resulted in strains in the balance between demand and supply. Some students are courted with several offers, but many have to apply to an inordinate number of institutions just to receive a few interview invitations. A significant number of students receive no invitations to interview.

Although some Ph.D.s receive several job offers, many appear ill-prepared for the realities of the market.

There are reports that in some subfields, such as computer science theory, the situation has changed quite dramatically over the last five years. Students who in the past had expectations of landing tenure-track positions at research universities are finding they have to revise expectations. Many settle for postdoctoral positions, with no clear expectations of what form of employment might follow. The field's expectation of significantly increased demand for the employment of S&E Ph.D.s at four-year colleges and non-Ph.D.-granting universities is not being realized.

What forces are causing these trends? Should computer science and engineering produce fewer Ph.D.s? Should certain subfields be emphasized? Should we revise Ph.D. education to give students a broader background and preparation for more diverse careers? If so, what mechanisms are appropriate?

One can consider various possibilities. In a broad sense, computer science and engineering provides the intellectual underpinnings for the huge and dynamic computer and information industry which by some reckonings, already is larger than the automobile or energy industries and now rivals the chemical industry. Furthermore, driven by new ideas, the industry is still growing rapidly. This would seem to call for substantial Ph.D. production.

However, industry continues to restructure. Several industrial laboratories are reducing their hiring plans or significantly changing the mix of skills they seek. The 1992-93 CRA Taulbee Survey showed that academia in North America continues to be the largest employer of new Ph.D.s—331 or 30% of the Ph.D.s found jobs in academia. Industry was not far behind—292 or 29% found jobs in this sector.

In academia, too, changes are afoot. These include some broadening of S&E graduate education and Ph.D. production to more institutions across the United States and Canada, as well as increasing the connections with other disciplines. However, a panel sponsored by the National Science Foundation, the National Research Council and the Office of Science and Technology Policy in early February concluded that in all areas of science and engineering, most Ph.D.s are too narrowly educated. Panel discussions suggested that increased emphasis on cross disciplinary research and the requirements of research flexibility across a lifetime career will require a broader education and one more closely tied to industrial experience.

In the latest CRA Taulbee Survey, 28% of the academic CS and CE hiring was in non-Ph.D. departments. An additional 9% of the hiring was in departments other than computer science or computer engineering. If it is true that most of the current Ph.D. training is designed to educate students to be like their mentors, the above data suggests that perhaps only 20% of our Ph.D. students have their education targeted to the kinds of jobs they will end up taking.

The same CRA survey also indicated that only 2% of new Ph.D.s were unemployed. The accuracy of this may be questionable because 17% of new Ph.D.s were unaccounted for in the survey.

Possible actions

We believe that it is a major responsibility of the field to obtain and disseminate information to allow stakeholders (students, faculty, employers, administrators and funding agencies) to make informed decisions. The CRA Taulbee Survey forms a good baseline. The survey has been extended to include information related to the employment of Ph.D.s, the number of B.S. and M.S. degrees granted by departments on the CRA Forsythe List (North American S&E Ph.D.-granting departments) and the number of incoming graduate students. But more could be done. The following list of suggestions is not intended to be a definitive set of ideas, but rather they are possibilities worth discussing. Some of these items were discussed at the Computer Science Conference in Phoenix in March.

• *Collect information by subfields.* While the partitioning of any discipline such as computer science and engineering into subfields is fraught with difficulty of definition, it would be useful for stakeholders to know what is happening in areas such as artificial intelligence, systems, theory or VLSI. CRA Forsythe schools could be asked to provide information about the number of Ph.D.s by subfield and their employment profile, using either the Association for Computing Machinery or the NSF classification system.

• *Collect information from potential employers, particularly industry and schools not on the CRA Forsythe List.* It would be particularly useful to obtain information about future hiring trends and qualitative needs employers see regarding how well universities prepare Ph.D.s for these employers' segment of the job market. If done exhaustively, this would be a huge undertaking. It probably would not be feasible to obtain a complete picture, particularly from industrial organizations. But more could be done to obtain more accurate forecasts of industrial demand and much more could be done to obtain accurate forecasts of demand from non-Ph.D.-granting departments. This information, when combined with the CRA Taulbee Survey, could yield a better quantitative and qualitative picture of the demand-supply picture in computer science and engineering. A starting point might be to collect information on recent hires to see if there are historical trends.

• *Gather perspectives from various university departments.* A number of departments in North America have some systematic mechanisms for informing their students about the job market. More departments could work to make their students, as well as prospective students, better informed about the job prospects and the job history of their department's Ph.D. recent recipients. Reports and papers from departments now doing this—possibly published in news journals such as *Computing Research News*—would give the community useful examples of what others are doing.

• *Broaden or change training for Ph.D.'s in computer science.* The following questions should be asked: Should the current education program for Ph.D.'s be broadened to be more interdisciplinary? Should the education program prepare students for a career teaching in four-year institutions where they will be expected to teach a range of computer science classes? Should Ph.D. training include more industrial experience? If the above-mentioned emphases are added, what should be subtracted from the education program?

• *Offer grant support for human resource development.* Granting agencies could encourage innovative Ph.D. programs. They also could direct human resource support through research assistants by increasing such support for principal investigators who have good track records for placing their Ph.D.s.

These are just a few possibilities. Discussing these suggestions and others would be helpful so we can refine these ideas into a useful and manageable set. Overall, the CS&E community should get together to effectively leverage its human resources for the maximum benefit of society and its stakeholders.

Readers who would like to discuss their views with the authors of this article can contact the authors at the e-mail addresses listed below. The CRA Conference at Snowbird '94 this July will feature a discussion of the supply-demand topic and a draft proposal.

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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. Headings or titles requested in all uppercase or bold will be set in bold and will count as two words.

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.

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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. (An ad published in the September issue must show an application deadline of Oct. 1 or later.) Advertising copy must be received at least one month before publication. (The deadline for the September issue is Aug. 1.)

NASA Goddard Space Flight Center
Center of Excellence in Space Data and Information Sciences

The Universities Space Research Association (USRA) and the University of Maryland invite applications for the position of director of the Center of Excellence in Space Data and Information Sciences (CESDIS), located on-site at the NASA Goddard Space Flight Center in Greenbelt, MD.

CESDIS was established in 1988 by NASA, USRA and the University of Maryland, with the charter to carry out advanced research on computer science issues supporting large-scale NASA data and computational systems for Earth and space science. CESDIS places research at leading universities through peer-reviewed calls for proposals and also houses a small resident and visiting research staff.

Current CESDIS-sponsored research spans a broad range of areas, including parallel computing, database systems, digital libraries, input/output systems, image processing, data compression, performance measurement and intelligent data management. At present, CESDIS funds research at 29 universities and laboratories, houses an on-site staff of 11 and oversees an annual budget of about $3 million. As NASA enters an important new era of global change research, CESDIS will face exciting new challenges.

A unique opportunity exists for a dynamic and visionary computer scientist to lead this NASA-supported research institute. Applicants must have an established research record in an area of importance to NASA, such as high-performance computing, data management, scientific visualization, or relevant Earth or space computational science. Management experience and a demonstrated ability to lead collaborative research projects involving universities, government and industry are desirable. The preferred candidate also must meet eligibility requirements to become a senior research scientist, adjunct full professor or tenured full professor in an appropriate department of the University of Maryland at College Park. Salary and benefits are competitive and attractive and will depend on the individual's qualifications.

The application deadline is July 1. Send a complete resume and the names of three references to Dr. Richard Herman, Dean, College of Computer, Mathematical and Physical Sciences, Room 3400, A. Williams Building, University of Maryland, College Park, MD 20742-3281.

USRA and the University of Maryland are equal opportunity employers.

University of Chicago
Department of Computer Science

Junior and senior positions are available for outstanding candidates with expertise in one of the areas of experimental computer science, such as programming languages, distributed systems or computer architecture. Successful applicants will have the opportunity to help create a new systems group in the department, complementing the existing very strong theory and AI groups. We might consider truly exceptional candidates in other areas.

Send curriculum vitae and three letters of reference to Professor Janos Simon, Chair, Department of Computer Science, University of Chicago, 1100 E. 58th St., Chicago, IL 60637. E-mail inquiries can be directed to: *chair@cs.uchicago.edu*.

The University of Chicago is an equal opportunity, affirmative action employer.

California Institute of Technology
Department of Computer Science

The California Institute of Technology invites applications for a tenure-track position from persons with promise for innovative research and teaching. Exceptionally well-qualified applicants may be considered at the associate or full-professor level. Initial junior faculty appointment is normally for four years and is contingent upon completion of a Ph.D.

Our department seeks to strengthen and broaden its research and teaching program from present strengths in concurrent computation, VLSI, computer graphics and formal methods of programming into complementary areas.

Please send a resume, list of publications, copies of your best publications and names of at least three references to Mani Chandy, Chair, Computer Science Steering Committee, Caltech 256-80, Pasadena, CA 91125.

The California Institute of Technology is an equal opportunity, affirmative action employer. Women and minorities are encouraged to apply.

University of Illinois, Chicago
Department of Electrical Engineering and Computer Science

The Department of Electrical Engineering and Computer Science invites applications for tenure-track faculty positions at the junior and senior levels. Applications for instructorships also are invited. A Ph.D. in computer science or equivalent is required by the date of appointment (except for instructorships).

Areas of prime interest are parallel and distributed processing, computer networking, programming languages, computer architecture and operating systems. Candidates should have outstanding research and teaching potential.

UIC is one of four Research-I Universities in the state of Illinois. The EECS Department has 50 faculty members and about 500 graduate students in EE and CS. The department has new research labs with state-of-the-art workstations in a newly constructed Engineering Research Building.

Send a resume and the names of at least three references to Dr. Roger Conant, Search Committee Chair, Department of EECS (M/C 154), University of Illinois at Chicago, 1120 SEO, 851 South Morgan St., Chicago, IL 60607-7053.

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Syracuse University
School of Computer and Information Science

The Syracuse University School of Computer and Information Science (CIS) offers comprehensive programs in computer science and information science. CIS is strongly interdisciplinary, reflecting the fact that information and computation are integral parts of many disciplines.

Degree programs are offered at the bachelor's, master's and doctoral levels. CIS also offers an undergraduate concentration in computational science as well as master and doctoral-level certificates.

The research interests of the faculty lie in the areas of theory of computation, programming languages, parallel programming, artificial intelligence, computer architecture of symbolic computation, parallel computing, neural networks, computational science, logic programming and coding theory and combinatorics.

Two independent research centers maintained by Syracuse University—the Northeast Parallel Architectures Center (NPAC) and the Center for Computer Applications and Software Engineering (CASE)—provide computing and research opportunities for all students.

Syracuse University has a growing stature in the sciences and maintains outstanding traditions in music, art, drama and public affairs.

For application and financial aid information, contact Barbara Rivers, School of Computer and Information Science, Suite 4-116, Center for Science and Technology, Syracuse University, Syracuse, NY 13244-4100. Tel. 315-443-2368; fax: 315-443-1122.

Communications from Page 1

HR 3636 was introduced by Rep. Edward J. Markey (D-MA) in November. A mark-up was held March 16 before the Energy and Commerce Committee. Several amendments were adopted, including one that adds postsecondary schools to a section requiring the FCC to conduct a feasibility study of giving preferential rates to certain institutions.

Also, an anti-redlining amendment was adopted in HR 3636 that prohibits companies that offer video services from excluding or discriminating against low-income and minority areas.

This amendment grew in part from lobbying by such groups as the Consumer Federation of America, the Center for Media Education and the Ralph Nader group, Taxpayer Assets Project, which showed that of the 20 video-service applications filed with the FCC, most were targeted at high-income neighborhoods with few minorities.

S 1822 was introduced by Sen. Ernest F. Hollings (D-SC) in February. It has not gone through mark-up but was discussed by administration officials at a Feb. 23 hearing before the Commerce, Science and Transportation Committee.

During the hearing, Commerce Secretary Ron Brown submitted the Clinton administration's recommendations and pointed out specific proposed changes to S 1822. Despite differences between Clinton's proposals and legislation under consideration, there is much consensus on the bill.

One of the differences pertains to state restrictions that shield local telephone companies from competition. S 1822 would allow FCC regulations to preempt those restrictions in two years, while HR 3636 would do so in one year. Brown argued that the restrictions should be preempted immediately.

"Competition will take time to develop even if entry barriers are dropped immediately, and such a development will not threaten universal service," Brown said.

He argued in favor of adding a provision to S 1822 that would prohibit states from regulating the rates of long-distance service provided by local telephone companies. "In this manner, we would more quickly bring the advantages of price competition to local consumers," he said.

S 1822 and HR 3636 allow local companies to provide video programming but prohibit cross-ownership of cable and telephone companies. Brown said the bill should allow the FCC to revisit the issue in five years.

Furthermore, he proposed that the open-access and interoperability requirements that apply to telephone service should also apply to video service.

"The administration proposes that such a video programming service, operated by a local telephone company, must make channel capacity available to unaffiliated video programmers on a non-discriminatory basis," Brown said. "It is important that the open-access tradition of telephony be extended generally to all parts of the network that will be providing digital services."

Brown also proposed a new title to S 1822 that would exclusively govern those companies offering two-way broadband, switched digital services to at least 20% of their subscribers. This title would supersede and resolve conflicting regulations that might exist in other provisions of the bill when applied to a company offering such a variety of services.

The new title "responds to the changing marketplace by providing a future-oriented approach that is both pro-business and pro-consumer," Brown said.

Association News

CRA CONFERENCE AT SNOWBIRD '94 ✦ JULY 10-12 ✦ SNOWBIRD, UTAH

The theme for this year's Computing Research Association conference for department chairs and research program directors is "Preparing for the 21st Century." We will focus on two areas:

Education: What are the changes and challenges in public and industrial expectations for higher education in general? In computer science and engineering education in particular?

Research: What changes and challenges will occur in research interactions between academia, government and industry? In federal science and technology policy? In international collaborations?

This year's plenary sessions are designed to foster interaction between the key representatives from industry and academia, who are leading the sessions, and attendees. The conference agenda lists possible discussion topics, but other relevant issues raised by attendees will be discussed.

A special program specifically for industrial research directors will run parallel to the regular conference program. The research directors will attend the conference's morning plenary sessions. In the afternoons they will attend workshops specifically oriented toward issues of concern to them.

To receive registration information, contact CRA at 1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009. E-mail: info@cra.org

Preliminary Agenda

Sunday, July 10

Registration 3:00PM–7:00PM

Welcome Reception 6:00PM–7:30PM

Dinner and State of the CRA Address 7:30PM–9:30PM

Speakers: David A. Patterson, chair of the CRA Board of Directors, and Fred W. Weingarten, CRA's executive director

The CRA Distinguished Service Award and the CRA Nico Habermann Award also will be presented after the dinner

Monday, July 11

Breakfast Buffet 7:00AM–8:30AM

Plenary Session I 8:30AM–10:15AM
Educating for the 21st Century
Session leaders: To be announced.

Possible discussion topics:
- What will a computer professional's job be like in 2000?
- What skills will professionals in industry need?
- What shifts are likely in the education of computer professionals?
- What are supplies and demands likely to be?
- How is the role of the university changing? Are the changes permanent or just temporary and related to the recession?
- What is the role of industrial research labs?
- What is the computer science community doing to address the "social agenda?"

Morning Break 10:15AM–10:45AM

Plenary Session II 10:45AM–12:30PM
Research in the 21st Century
Session leaders: To be announced.

Possible discussion topics:
- What changes are occurring in federal research policy and funding? How will these changes affect the computing research community?
- Is what was predicted in *Computing the Future* happening now? Will it happen? Should it happen?
- What can and should be done to increase collaboration between academia and industry?
- How important is international collaboration?

Luncheon 12:30PM–2:00PM

CRA board members will host at each table and solicit input about the conference themes and other issues of concern to the computing research community

Workshops I (parallel sessions) 2:00PM–3:30PM
Topics to be announced.

Reception 6:00PM–7:00PM

Dinner and Discussion 7:00PM–9:00PM

CRA Chair David Patterson will summarize and discuss comments gathered by board members during the luncheon.

Tuesday, July 12

Breakfast Buffet 7:00AM–8:30AM

Workshops II (parallel sessions) 8:30AM–10:00AM
Topics to be announced.

Morning Break 10:00AM–10:30AM

Plenary Session III 10:30AM–Noon
Perspectives on the Conference Themes

Session leaders will discuss the key concerns, preliminary findings and actions proposed in workshops and informal sessions that relate to the conference theme.

Luncheon Noon–1:30PM

Attendees are invited to form their own affinity discussion groups.

Workshops III (parallel sessions) 1:30PM–3:00PM
Topics to be announced.

CRA co-sponsors forum

The Computing Research Association was a joint sponsor of a meeting on R&D issues related to the National Information Infrastructure. More than 300 academic, industrial and government researchers attended "R&D for the NII: Technical Challenges," held Feb. 28 and March 1 in Gaithersburg, MD.

The meeting was held in response to requests from the administration and Congress for a more detailed agenda of research to support the development of an advanced NII.

Other co-sponsors were EDUCOM, the Computer Systems Policy Project, the American Electronics Association, the Computer and Business Equipment Manufacturers Association, the Council on Competitiveness and the Cross Industry Working Team. The National Institute of Standards and Technology was the host.

Mary K. Vernon, a computer science professor at the University of Wisconsin and a CRA board member, chaired the technical program committee.

The Office of Science and Technology Policy, the National Economic Council, NIST, The National Science Foundation and the Advanced Research Projects Agency coordinated and advised in the planning of the meeting. NSF helped fund the effort.

The meeting began with a plenary discussion on applications, then broke into nine parallel sessions:
- Mechanisms for Security and Privacy,
- Interoperability,
- Information Access,
- Ease of Use,
- Portability, Mobility, Ubiquity,
- Network Dependability and Manageability,
- Infrastructure for Applications Development,
- Multimedia Technologies and
- Network and Systems Components and Architecture.

A final report containing the research recommendations for each track will be published in May and presented to the administration and congressional staff. For information on pricing and availability, send E-mail inquiries to info@cra.org

IFIP creates new group

The International Federation for Information Processing (IFIP) recently established the Specialist Group on Foundations of Computer Science (SGFCS). This is the first special body in IFIP that will support the development of theoretical computer science (TCS) worldwide.

SGFCS members are being appointed based solely on their professional achievements. However, an effort is being made to appoint members who represent various technical and geographical areas.

Three working groups have been established: Continuous Algorithms and Complexity, Descriptional Complexity, and Foundations of Systems Specifications. Of special importance is support of working groups in cross disciplinary areas and in important emerging areas of TCS.

TCS will be presented at the IFIP World Computer Congresses and an effort will be made to initiate and support meetings outside of North America and Europe.

Although it may be difficult for SGFCS to achieve its goals, this worldwide, unifying activity should be important to the computer science community. The increase in financing at local or regional levels makes regionalization in science and technology an increasingly visible issue that does not go well with attempts for worldwide cooperation. However, the increasing competition between sciences and technology areas for resources creates a strong need for the CS community to be well-organized and have an international base.

The CS community is used to getting enough support for essential problems and may not be fully aware of importance of the coordinated international activities that IFIP and its bodies are developing.