CRA Profiles CS/CE Ph.D.-Granting Departments

By Stephen Seidman and Mirek Truszczynski

In spring 2000, the Computing Research Association conducted its second survey of North American Ph.D.-granting programs of computer science and engineering to collect data on budget, research funding, staff support, space, faculty teaching loads, and graduate student support. The survey requested data for the most recent annual period for which the data were available. In most cases this meant the period from July 1, 1998 to June 30, 1999. The results of the survey were reported in a workshop at the 2000 CRA Conference at Snowbird in July.

The survey was sent to 186 Ph.D.-granting programs in computer science and computer engineering. Because the response from Canadian programs and computer engineering programs was both small and unrepresentative, their data were not included in this report. The response rate for US programs was 55.7 percent, with 88 out of 158 programs responding to the survey.

The US CS programs are divided into four groups according to the most recent National Research Council ranking: departments ranked 1 to 12 (6 responses); departments ranked 13 to 24 (9 responses); departments ranked 25 to 36 (10 responses); and departments ranked 37 or higher (63 responses). In a different analysis, we divided the US CS programs according to whether the corresponding institutions are public (64 responses) or private (24 responses).

Support Staff

Table 1 presents the mean and median ratio of the number of secretaries, computer support staff, and research programmers to the number of full-time equivalent (FTE) faculty for all categories of programs described above. Privately funded institutions have generally higher levels of staff support per FTE than institutions that are publicly supported, and staff support is generally better in higher ranked departments. Table 2 shows the percentage distribution in sources of support for department staff (means over all responding units in each group).

Budget

Table 3 presents the mean and median annual department expenditures per faculty member (in thousands of US dollars). The variation between the categories is extremely wide. For example, the median department expenditure per FTE for a program ranked 37 or higher is more than 60 percent lower than the same measure for programs ranked 13 to 24. Some of the variation may be due to differing interpretations of the survey question.

Table 4 summarizes the survey data on the amount of external funding per FTE faculty member. There is a significant difference between private and public institutions and between top-ranked departments and departments ranked 37 and above.

Table 5 illustrates the role of various funding agencies in providing external research funding. Overall, NSF and DARPA provide about 50 percent of research funds, but the breakdown varies significantly across the groups of programs. NSF provides the highest proportion of funding in all program groups. DARPA plays a significant role in funding for programs ranked 1 to 36. In other programs, sources other than DARPA play a more important role in supporting research.

Space

Table 6 summarizes the survey data on departmental space. There are significant differences between US private and public institutions, and between top-ranked US departments and those ranked 37 and higher. For example, the category means suggest that private institutions have nearly 35 percent more space per faculty member than public institutions. (If category medians are used, the corresponding margin is 20%.) Similar differences appear when data for department ranking are used. For example, departments ranked 1 to 36 report approximately 1300 sq. ft. per FTE faculty member (using median data), while departments ranked 37 and up report 1035 sq. ft. per FTE.

In the survey, we also asked about the use of departmental space. Since we found no clear trends as a function of type or ranking, the average space usage over all responses is reported in Table 7.

The survey indicates significant activity with respect to recent or forthcoming space allocated to US computer science departments. More than half (51%) of the US departments expect to gain new or newly renovated space, and 81 percent of these departments expect to have the new space by the end of 2003. The amount of the anticipated new space ranged widely (median 20,800 sq. ft., mean 31,503 sq. ft.). Department rank played a major role: the mean anticipated new space was 62,713 sq. ft. for departments ranked 1 to 36, and 18,299 sq. ft. for departments ranked 37 and higher.

The survey asked respondents to indicate sources of funding for newly acquired or renovated space. The responses are summarized in Table 8. Institutional and state funding were listed most often, 58 percent and 51 percent, respectively, followed by private (42%) and industrial (20%) funding. Federal funding was reported only sporadically.

Teaching Loads

Data submitted from departments using the quarter system were converted to semesters (1 quarter course = 0.67 semester course). An official annual teaching load of between 2 and 3 semester courses was reported by 52 percent of the respondents, and an additional 35 percent of the respondents reported an official load of between 3 and 4 semester courses. The minimum reported was 1.33 and the maximum reported was 8 semester courses. In Table 9, the data indicate that both official and actual teaching loads are strongly correlated with department rank. Teaching loads reported by departments at private universities are lower than those reported by departments at public institutions.

Table 1. Support Staff per Faculty Member

	Secretarial Staff		Computer Staff		Research Staff	
	mean	median	mean	median	mean	median
Private	0.47	0.46	0.23	0.21	0.41	0.20
Public	0.36	0.31	0.23	0.18	0.17	0.08
US CS Ranked 1-12	0.54	0.49	0.38	0.40	0.22	0.14
US CS Ranked 13-24	0.58	0.60	0.25	0.20	0.47	0.47
US CS Ranked 25-36	0.56	0.56	0.37	0.34	0.22	0.22
US CS Other	0.33	0.29	0.19	0.14	0.21	0.05
US	0.39	0.33	0.23	0.19	0.24	0.09

Table 2. Institutional/External Support Staff Funding, Proportion of Total

	Secretarial Staff		Computer Staff		Research Staff	
	Inst	Ext	Inst	Ext	Inst	Ext
Private	0.89	0.11	0.83	0.17	0.06	0.94
Public	0.90	0.10	0.83	0.17	0.06	0.94
US CS Ranked 1-12	0.95	0.05	0.66	0.34	0.22	0.78
US CS Ranked 13-24	0.78	0.22	0.58	0.42	0.06	0.94
US CS Ranked 25-36	0.81	0.19	0.75	0.25	0.22	0.78
US CS Other	0.92	0.08	0.90	0.10	0.00	1.00
US	0.90	0.10	0.83	0.17	0.06	0.94

Of the departments that responded to the survey, 93 percent permit teaching-load reductions. Of these departments, 85 percent allow for reduction as part of startup packages for new faculty members. Other reasons commonly cited for load reductions are: administrative duties, course buyout, strong research program and type and size of class (cited by 88%, 78%, 37%, and 28% of the departments, respectively). The average reported buyout was 22 percent of annual salary; the median buyout rate reported was 20 percent.

Of the departments that responded to the survey, 72 percent permit teaching-load increase; of those reporting, 78 percent reported a shift in primary responsibility to teaching as the reason for the increase.

Graduate Student Support

For 84 percent of US programs, the standard work requirement for teaching assistants is 20 hrs/week, with the mean being close to 20 hrs/week for all categories of programs. For research assistants, 88 percent of the US programs report 20 hrs/week as the standard work requirement. There were no significant differences between public and private institutions or between institutions of different rankings.

Table 10 gives the number of TAs and RAs per FTE faculty member. The TA ratio was higher for public institutions, while the RA ratio was higher for private institutions. Highly ranked programs also tended to have higher ratios for both TAs and RAs. Table 10 gives the ratio of students on full fellowship to the number of FTE faculty. This ratio is higher for private institutions than for public ones, and, once again, highly ranked programs tended to have higher ratios.

The survey also asked for the net value of stipends (stipend minus tuition and fees) for teaching assistants, research assistants, and those with fellowships. The mean and median net stipends are shown in Table 11. Once again, there is some variation in net stipends between public and private institutions, and also among programs of different rank. The data also show that while TA stipends do not differ much from RA stipends, both are lower than fellowship stipends.

Table 3. Annual Operating Budget per Faculty Member (thousands of US dollars)

	mean	median
Private	$29	$22
Public	38	16
US CS Ranked 1-12	15	13
US CS Ranked 13-24	50	43
US CS Ranked 25-36	71	33
US CS Other	30	14
US	36	18

Table 4. Annual Expenditure from External Sources per Faculty Member (thousands of US dollars)

	mean	median
Private	$237	$200
Public	116	82
US CS Ranked 1-12	187	182
US CS Ranked 13-24	287	224
US CS Ranked 25-36	164	151
US CS Other	113	75
US	144	90

In response to a survey question on factors affecting the amount of the stipend, academic progress was given most frequently (57%). Other commonly reported factors are: passed qualifier (49%), differences in the source of funding (45%), recruitment enhancements (32%), and GPA (15%).

The survey provided interesting insights into recruitment incentives used to attract new graduate students. Stipend enhancements were reported by 45 percent of the US programs; the mean and median amounts were $4,854 and $3,000. Guaranteed

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Table 5. External Sources of Support, Percent of Total Expenditure

	US	Private	Public	Ranked 1-12	Ranked 13-24	Ranked 25-36	Other
NSF	37%	35%	38%	42%	31%	38%	37.4%
DARPA	13%	21%	11%	31%	24%	20%	8.3%
NIH	2%	2%	2%	0%	3%	3%	2.1%
DOE	3%	1%	3%	3%	0%	7%	2.3%
State Agencies	11%	3%	13%	4%	2%	3%	14.2%
Industrial Sources	12%	16%	11%	9%	7%	15%	12.9%
Other Defense Research Agencies	4%	4%	4%	1%	8%	1%	4.3%
Other Mission-Oriented Federal Agencies	13%	17%	12%	10%	20%	11%	12.1%
Other	5%	1%	6%	0%	5%	2%	6.5%

multi-year support was reported by 51 percent of programs; 20 percent of these programs offered support for 2 years, 14 percent offered support for 3 years, and 59 percent offered support for more than 3 years. Paid visits to campus were reported as an incentive by 51 percent of programs, with a median amount per visit of $500 and a maximum of $1,500. Finally, guaranteed summer support was reported by 30 percent of the programs; the mean and median amounts reported were approximately $4,000.

Conclusions

We have not attempted to provide any comparison of the results of this survey with those of the 1998 survey, since we are still working to develop a body of questions that can consistently generate useful and reliable results. For example, we have had difficulty in phrasing questions that deal effectively and reliably with faculty teaching loads. We have asked for data on "official" and "actual" teaching loads. The ways in which departments treat graduate seminars and advising are extremely variable, and it is hard to find words that can pin this down in a uniform manner. Department budgets and operating expenditures raise similarly complex issues that are difficult to resolve in the brief text of a question.

The results of the survey were presented at a workshop at the CRA Conference at Snowbird in July. The initial feedback from the workshop suggests that the survey data are of great interest to computer science and computer engineering departments.

The CRA Board is considering the future of the Profiles Survey. One possibility would be to incorporate some of the Profiles questions into the annual Taulbee Survey.

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Stephen Seidman and Mirek Truszczynski, who also oversaw the 1998 Profiles Survey, chair the computer science departments at Colorado State University and the University of Kentucky, respectively. ∎

Table 6. Departmental Space (in sq. ft.)

	Total Space		Space per Faculty	
	mean	median	mean	median
Private	23,359	20,561	1,506	1,250
Public	23,580	17,600	1,118	1,045
US CS Ranked 1-12	47,371	46,148	1,439	1,381
US CS Ranked 13-24	32,170	31,760	1,318	1,310
US CS Ranked 25-36	31,171	24,532	1,217	1,279
US CS Other	18,620	16,118	1,199	1,035
US	23,516	19,253	1,230	1,103

Table 7. Space Allocation, Percent of Total

	Offices	Research	Instructional	Conference
Current space	54.0%	21.0%	18.0%	7.0%
Planned Space	46.5%	30.0%	16.0%	7.5%

Table 8. Source of Funding for Construction/Renovation Project

Institutional	58%
Federal	2%
State	51%
Industrial	20%
Private	42%

Table 9. Faculty Teaching Load (Semester Courses)

	Official		Actual	
	mean	median	mean	median
Private	3.07	3.00	2.75	2.26
Public	3.63	3.17	2.93	3.00
US CS Ranked 1-12	2.58	2.75	2.41	2.40
US CS Ranked 13-24	2.74	3.00	2.08	2.00
US CS Ranked 25-36	2.54	2.58	2.17	2.00
US CS Other	3.85	4.00	3.15	3.00
US	3.49	3.00	2.88	2.87

Table 10. Number of FTE Students Per Faculty

	Teaching Asst.		Research Asst.		Fellowship	
	mean	median	mean	median	mean	median
Private	1.26	1.06	2.26	1.71	0.79	0.38
Public	1.46	1.17	1.32	1.15	0.30	0.24
US CS Ranked 1-12	1.81	1.74	1.76	1.51	0.61	0.55
US CS Ranked 13-24	0.87	0.85	2.55	1.99	0.37	0.13
US CS Ranked 25-36	1.38	1.17	1.78	1.60	0.25	0.17
US CS Other	1.44	1.08	1.38	1.12	0.49	0.25
US	1.41	1.09	1.56	1.31	0.45	0.27

Table 11. Graduate Student Stipends

	Teaching Asst.		Research Asst.		Fellowship	
	mean	median	mean	median	mean	median
Private	$10,568	$12,000	$12,134	$13,185	$14,273	$14,175
Public	9,925	11,064	10,268	11,074	12,561	13,500
US CS Ranked 1-12	14,459	14,500	14,239	14,500	16,012	16,800
US CS Ranked 13-24	12,369	12,857	13,679	13,806	14,871	14,588
US CS Ranked 25-36	10,503	12,805	10,489	12,497	14,955	13,870
US CS Other	9,350	10,165	10,065	10,620	11,394	12,625
US	10,088	11,250	10,723	11,950	12,989	13,884

White House Names New Director of National Coordination Office for Computing, Information, and Communications

Neal Lane, the President's Science Advisor, has named Cita Furlani as Director of the National Coordination Office for Computing, Information, and Communications, effective October 1, 2000.

Ms. Furlani has been the Acting Deputy Director of the Advanced Technology Program at the National Institute of Standards and Technology. Previously she directed the interagency Committee on Applications and Technology of the former Information Infrastructure Task Force on behalf of the NIST Director, helping to create the Administration's National Information Infrastructure Agenda for Action and supporting the work of the NII Advisory Council.

The National Coordination Office, established under the White House Office of Science and Technology Policy's National Science and Technology Council, is responsible for coordinating the federal interagency IT R&D programs. As part of this effort, the National Coordination Office works closely with the Interagency Working Group (IWG) for IT R&D to formulate implementation plans and a unique crosscutting budget to assure that the overall federal information technology research is properly focused on the research priorities established by the IWG. The National Coordination Office also supports the influential President's Information Technology Advisory Committee, which provides guidance to the President on key issues related to IT research.

Ms. Furlani has been a NIST employee since 1981. She holds a Master of Science degree in Electronics and Computer Engineering from George Mason University and a Bachelor of Arts degree in Physics and Mathematics from Texas Christian University. ∎