Computing Research News

COMPUTING RESEARCH ASSOCIATION, CELEBRATING 40 YEARS OF SERVICE TO THE COMPUTING RESEARCH COMMUNITY

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CONFERENCE AT SNOWBIRD

JULY 20 – 22, 2014
SNOWBIRD, UTAH

2014 CRA Conference at Snowbird

The event will be held July 20 – 22 in Snowbird, Utah.
Click here to view the updated program.

CRA thanks ACM, MERL and Dell for joining with IBM Research, Facebook, Google, Microsoft Corporation, National Security Agency, SRI International and Yahoo Labs as sponsors of the CRA Conference at Snowbird.

CRA welcomes its newest members:

Academic

Kean University
New Jersey Institute of Technology
Texas Tech University
University of South Alabama

Associate Lab

Elsevier

Labs and Centers

Dell Research
Two Sigma Labs

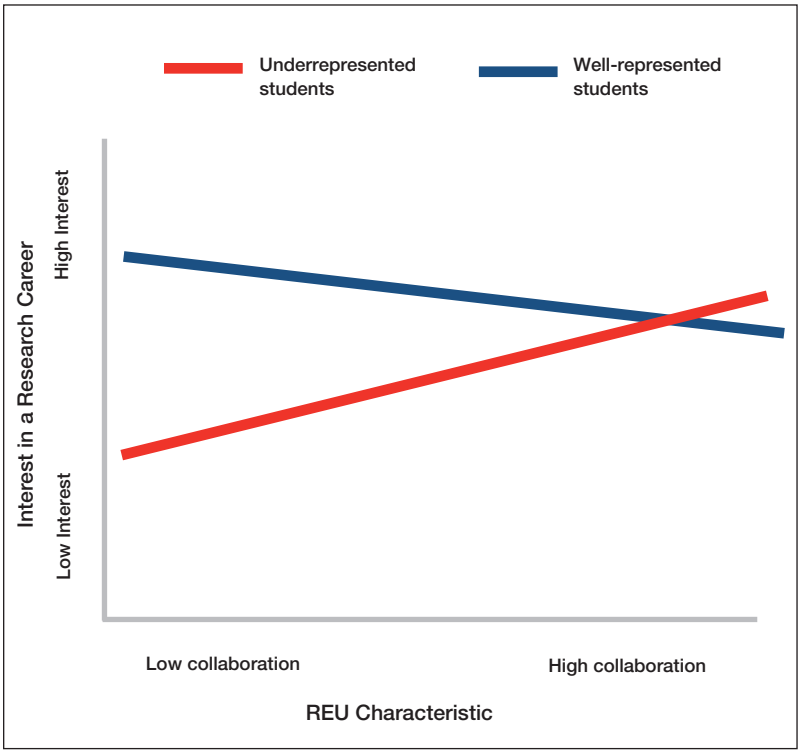
Former CRA Board member
Norm Jouppi
has received the
2014 IEEE Computer Society Harry H. Goode Award.
Read more here.

Center for Evaluating the Research Pipeline Infographic

By Jane Stout, CERP Director

Collaboration during REUs is Especially Important for Students from Underrepresented Groups

Forty four undergraduate students from underrepresented populations in computing (i.e., women + men of minority racial/ethnic groups) and 26 undergraduate students from well-represented populations in computing (i.e., Asian + White men) who had recently completed a summer NSF research experience for undergraduate students (REU) reported (a) how collaborative their REU had been and (b) interest in pursuing a research career later in life. Well-represented students reported strong interest in a research career, regardless of the degree to which their REU was collaborative. However, underrepresented students' interest was related to the collaborative nature of their REU, such that experience with a more collaborative REU was associated with more interest in pursuing a research career later on. This finding suggests that collaborative research environments in computing may be more important for underrepresented students' persistence in computing research careers than is the case for well-represented students.



Note: We assessed the collaborative nature of REUs by aggregating students' responses to the following questions: *How much experience, if any, did you gain through your summer research experience in (a) collaborating with others and (b) feeling like a member of a research community,* ranging from (1) No more than I had, to (4) Quite a bit more. Students' interest in a research career was assessed aggregating students' responses to the following questions: *How interested would you be in having a the following types of computing jobs after you finish your highest degree: (a) college/university professor and (b) a researcher in industry in government lab,* ranging from (1) Strongly disinterested to (4) Strongly interested.

Center for Evaluating the Research Pipeline

This analysis is brought to you by the CRA's Center for Evaluating the Research Pipeline (CERP). Want CERP to do comparative evaluation for your program or intervention? Contact cerp@cra.org to learn more. Be sure to also visit our website at http://cra.org/cerp/.

Expanding the Pipeline:
The NCWIT Scorecard: A Report on the Status of Women in Information Technology

By Wendy M. DuBow, Director of Evaluation, National Center for Women in Information Technology

In the last 10 years, the computing community has started paying more attention to the lack of gender diversity in the field. There have been myriad programs introduced to amend the problem, including awareness-raising campaigns, out-of-school and in-school courses, workshops, and camps. At the national level, there are policy movements to include computer science as a high school graduation requirement, new recruitment practices and other organizational reforms introduced at the university and industry levels, and more. Many of these movements have been evaluated, and many have shown promise that they have, or will, make a difference in their local context. However, to understand whether or not all of these interventions, taken together, have actually "moved the needle," we need to review the longitudinal data. How have girls' and women's representation in computing at the various levels changed, if at all, over time? And are we seeing any positive trends?

To scan the entire "pipeline" over time requires pulling data from a variety of different sources. Some of these sources are hard-to-find, available only upon custom order, or indecipherable to the average reader. The National Center for Women & Information Technology (NCWIT) collects these different statistics in a single, multi-section resource called The NCWIT Scorecard. The Scorecard provides a snapshot of illustrative statistics about the participation of girls and women in computing from K-12 through the workforce, all available for free download from the NCWIT website.

The Scorecard consists of a series of PowerPoint slide decks for each "segment" of the pipeline, and professionally designed statistical charts (each of which is downloadable as an individual .jpeg file). The PowerPoint files are presentation-ready, with "speaker notes" to assist, and the charts can be dropped easily into presentations, reports, or proposals. In addition, the entire Scorecard can be downloaded or printed as a PDF for easy reference or sharing with colleagues.

Information about the Entire Pipeline

The NCWIT Scorecard includes six distinct sections:

- Why Gender Diversity is Important to Computing
- Why Computing is a Good Career for Women
- Secondary Education
- Post-Secondary Education
- Workforce
- Thought Leadership & Innovation

Each section contains the latest relevant statistics, as well as ways readers and audience members can take action to make a difference in that segment of the pipeline.

Why Gender Diversity is Important to Computing

To ensure a common starting point for discussing the diversification of the computing field, the Scorecard begins with research-based reasons for why it is important to have diversity of thought and background. While many people are swayed by the moral arguments for gender equity in educational and work environments, it is also important in many cases to present the "business case." Five economic arguments are presented: expanding the qualified employee pool in the face of current and pending employee shortages, improving the bottom line, enhancing innovation, promoting social equality through technology, and reflecting the customer base.

Why Computing is a Good Career for Women

In NCWIT's experience, advocates for gender diversity in computing also need a set of economic arguments for why computing is an excellent career choice for women (and men); therefore, an entire section of the Scorecard is devoted to presenting data that supports computing as a career choice. This section includes data on low unemployment in the industry, high salaries, and high predicted job growth. Importantly, computing is a field where the wage gap between men and women is smaller than in many other fields. A salary chart excerpted from the Scorecard is shown below.

TOP 10 SALARIES FOR UNDERGRADUATE DEGREES, 2013

UNDERGRADUATE DEGREE	*Starting Salary*	*Mid-career Salary*
Petroleum Engineering	$98,000	$163,000
Chemical Engineering	$67,500	$111,000
Nuclear Engineering	$66,800	$107,000
Electrical Engineering (EE)	$63,400	$106,000
Computer Engineering (CE)	$62,700	$105,000
Aerospace Engineering	$62,500	$118,000
Computer Science (CS)	$58,400	$100,000
Actuarial Mathematics	$56,100	$112,000
Applied Mathematics	$50,800	$102,000
Statistics	$49,300	$99,500

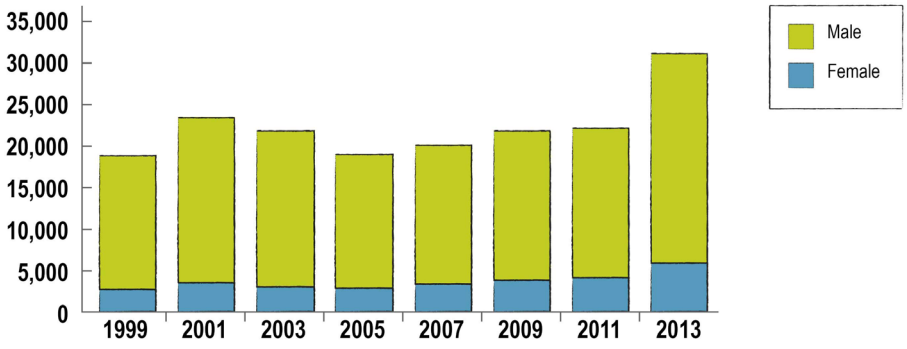
© NCWIT. Source: http://www.payscale.com/college-salary-report-2014/majors-that-pay-you-back ncwit.org/scorecard

Secondary Education

The Secondary Education section of the Scorecard includes charts and narrative about the computing-related preparation and experience of high school students (male and female). While most K-12 students are not exposed to rigorous computing classes in middle or high school, the number of college-bound students reporting at least some programming experience is growing, as is the number of students taking the Computer Science (CS) Advanced Placement (AP) exam. Still, only 1% of all AP exam-takers take a CS AP, and consistently only 19% or fewer of those students have been female (see chart below).

This section also explains the reasons why computing education is lacking at the secondary level, including the fact that AP computer science is often classified in high school as an elective, putting it in competition with music and art electives. Links to evidence-based recruitment and engagement strategies, as well as talking points for pushing for policy change, give the reader concrete strategies for taking action.

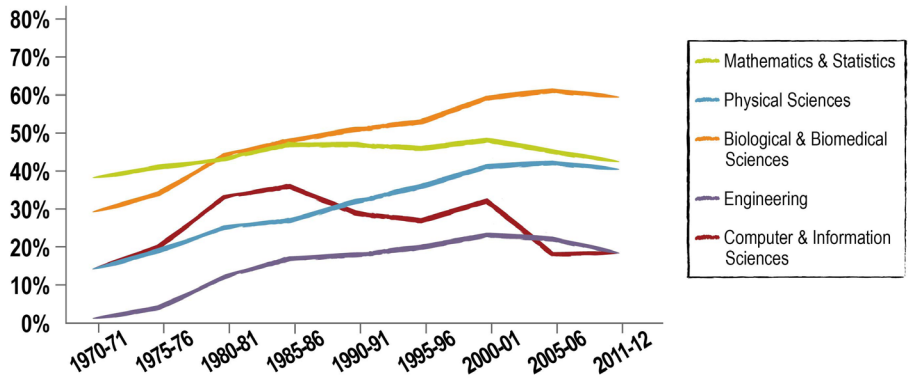
NUMBER OF ADVANCED PLACEMENT (AP) COMPUTER SCIENCE EXAM-TAKERS BY GENDER, 1999-2013



© NCWIT. Source: The College Board, AP National Summaries, 1999-2013.

ncwit.org/scorecard

FEMALE PERCENTAGE OF SELECT STEM UNDERGRADUATE DEGREE RECIPIENTS: A LONGITUDINAL LOOK



© NCWIT. Source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System.

ncwit.org/scorecard

Post-Secondary Education

In the Post-Secondary Education section, a number of charts highlight the dearth of women earning computing degrees compared to other STEM fields. The statistics cover two-year degrees, four-year undergraduate degrees, master's and doctoral degrees. The degree completions are compared across time, and the degrees earned by women are broken down by race, ethnicity, and U.S. resident status. As can be seen in the chart below, until recently, other STEM disciplines have been on a fairly steady trajectory with regard to female participation. In comparison, computing has been uneven, but it has held steady for the past six years.

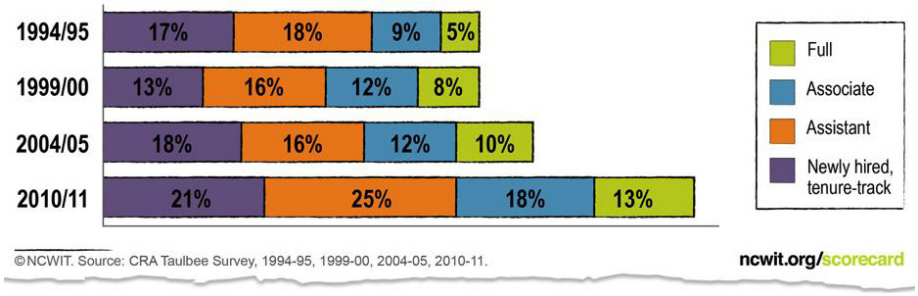
This section ends with a brief case study describing three undergraduate computing departments that successfully increased the number of female computing majors at their institutions: University of California at Irvine, Carnegie Mellon University, and University of Virginia.

Workforce

Like the preceding two sections, the Workforce section of the Scorecard includes colorful charts, an easy-to-read narrative, a case study and many links to relevant resource materials. As a companion piece to the Post-Secondary section, it also contains data showing the relative percentages of women in the computing workforce and other science professions, and the racial/ethnic breakdown of women in the computing workforce. U.S. Bureau of Labor Statistics data show that certain occupational classifications within computing have higher representation of women than others. For example, a much higher percentage of women hold database administrator positions than hold software engineer positions.

Drawing from CRA Taulbee survey data, the Scorecard also depicts the percentage of women among computer science faculty at PhD-granting institutions from 1995 through 2012. The chart below shows that the female percentage of faculty has increased at all ranks since 1995.

FEMALE PERCENTAGE OF COMPUTER SCIENCE FACULTY AT PHD-GRANTING INSTITUTIONS, 1995-2011



Thought Leadership & Innovation

The final section of the Scorecard focuses on how diversity contributes to technical innovation. Because there is relatively little research conducted in this arena, three different indicators are used: research on female and mixed-gender team patenting trends, female PhD publishing trends, and the representation of women in open source computing. This section also includes many links to practical resources for increasing women's contributions to thought leadership in computing.

How to Use the Scorecard

NCWIT's hope in publishing the Scorecard is to provide interested stakeholders at every level in their respective organizations with the tools necessary to educate others about the representation and participation of females in computing at the various stages of the pipeline over the last several decades. NCWIT's evaluation findings have suggested that sharing conclusive research and easy-to-understand data helps to convince people of the need for gender reform in the field. The Scorecard's description of promising practices, practical advice, and case studies are all intended to drive awareness and action from substantive knowledge.

NCWIT welcomes comments on the Scorecard and suggestions for other data charts and research summaries that readers would find useful. Please send feedback to evaluation@ncwit.org.

Additional Research with Practical Applications to the Academic Environment

The NCWIT website contains over 100 research-based resources to help you understand and explain the need for gender diversity in computing, and then take action to accomplish the necessary systemic changes. Recent resources include a Program-in-a-Box for how to do outreach into high schools, as well as tips on how to engage students in computing, how to retain them once you have them, and how to identify male allies and increase men's advocacy for reform. A selection of recent, relevant titles, include:

- Outreach: Roadshow-in-a-Box: Capitalizing on Models for Outreach
- Engagement: Top 10 Ways to Engage Underrepresented Students in Computing
- Recruitment: Strategic Planning for Recruiting Women into Undergraduate Computing: High Yield in the Short Term
- Retention: Key Practices for Retaining Undergraduates in Computing
- Male Allies: 8 Ways to Identify Male Advocates and 8 Ways to Increase Male Advocacy

Check out all the other materials available at www.ncwit.org/resources.

About the Author

Dr. Wendy DuBow is a senior research scientist at NCWIT. She is the author of The NCWIT Scorecard, a co-principal investigator on the male advocacy research, and co-creator of a new survey instrument that can be used to evaluate the impact of computing courses, camps and workshops on student engagement, self-efficacy, and intent to persist in the field. NCWIT is a non-profit, change-leader network of more than 450 corporations, academic institutions, government agencies, and non-profits working to increase women's meaningful participation in computing. NCWIT helps organizations recruit, retain, and advance women from K-12 and higher education through careers.

CCC to hold a workshop on Human Computation

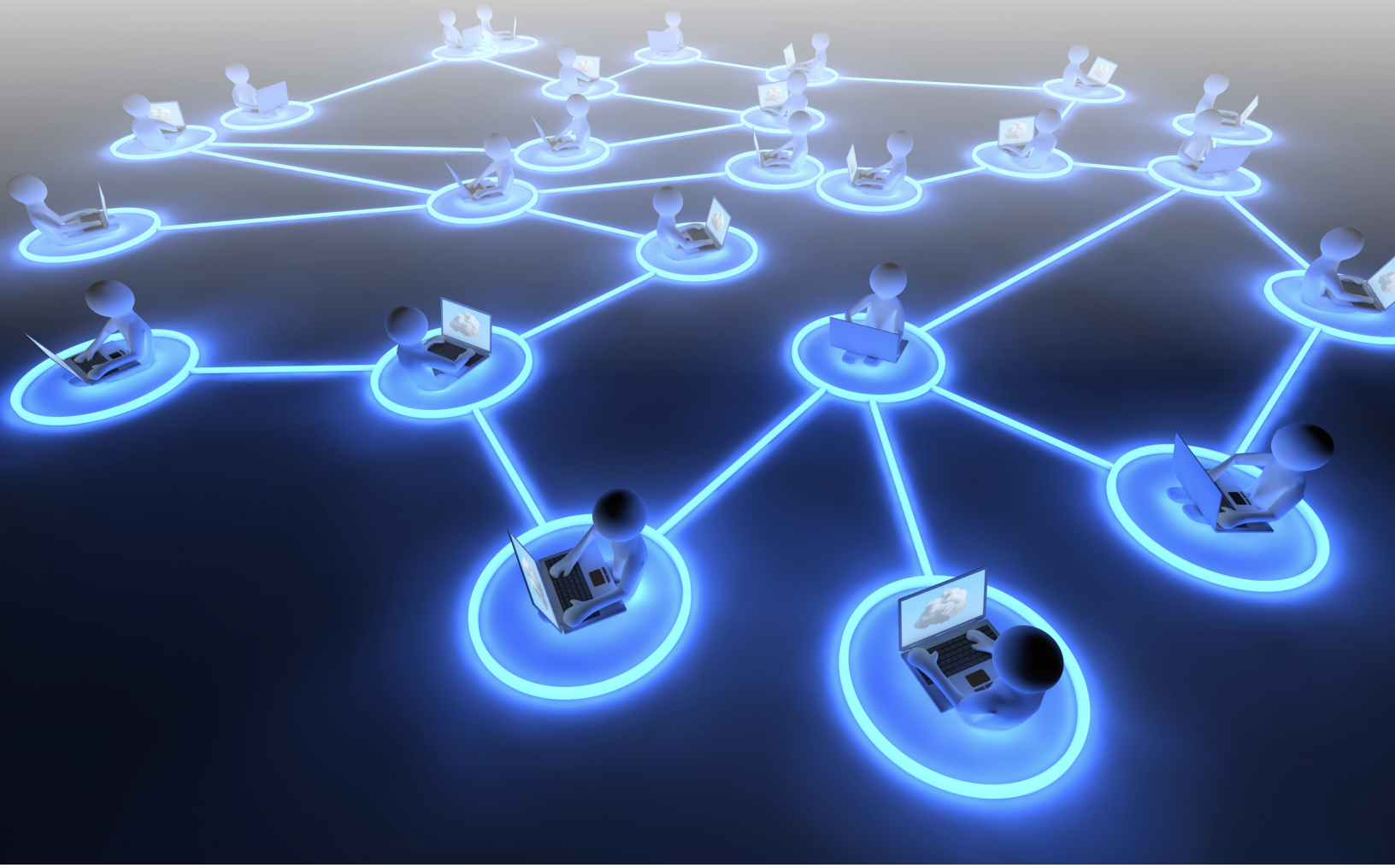
The Computing Community Consortium (CCC) will hold a Human Computation Roadmap Summit to explore the past and prospective impact of human computation (HC) and to identify the research areas and activities that will directly lead to the most beneficial societal outcomes. The goal of the workshop is to produce a national research roadmap for HC that will be briefed to the Hill toward new research funding and a national HC initiative.

Today we are witnessing a rapid integration of humans into information-processing systems. Some of this is emergent (e.g., social networks) and some deliberate (e.g., crowdsourcing). A research area has coalesced around understanding and engineering such systems toward novel capabilities. Indeed, these HC systems are embedded in society today, predicting epidemics, supporting crisis relief, improving patient outcomes, producing scientific data, enabling collective governance, augmenting collaboration, and archiving history.

Despite these claims, the vast transformative potential of HC has only begun to be tapped. Only by considering deeply the space of research possibilities and potential applications of HC from a variety of multidisciplinary perspectives can we hope to crystalize a vision that can guide us conscientiously and deliberately toward a maximally effective research agenda.

The workshop organizing committee includes Pietro Michelucci, Editor-in-Chief, Handbook of Human Computation;Janis Dickinson, Director of Citizen Science, Cornell Lab of Ornithology; Haym Hirsh, Dean of the Faculty of Computing and Information Science, Cornell University; Lea Shanley, Director of Commons Lab, Woodrow Wilson International Center for Scholars; Randall Bryant, Dean, Carnegie Mellon University & CCC Liaison; and Ann Drobnis, CCC Director.

The workshop will be held June 18-20 in Washington, DC. Additional information about the workshop can be found on the website. If you have any questions, please feel free to contact Ann Drobnis at adrobnis@cra.org.



Visions 2025: The New Making Renaissance: Programmable Matter and Things

The Visions 2025 initiative is intended to inspire the computing community to envision future trends and opportunities in computing research. Where is the computing field going over the next 10-15 years? What are potential opportunities, disruptive trends, and blind spots? Are there new questions and directions that deserve greater attention by the research community and new investments in computing research?

The second workshop to be held as a part of this series is **The New Making Renaissance: Programmable Matter and Things**.

Today's emerging "Manufacturing Renaissance" is radically different from the more traditional tides of innovation seen over fifty years of computation such as Moore's Law. Instead this disruptive innovation is more akin to the introduction of major transformative technologies such as the printing press, the programmable loom, and the computer itself. This new renaissance, driven by personal, creative, and independent manufacturing, will change not only the way that most items are designed, manufactured, and delivered, but also radically expand the range of potential artifacts, materials, interactivity, and applications.

This Manufacturing Renaissance has at its root the confluence of three major technological trends: (1) accessible, cheap, and fast creation of matter in new forms (e.g. 3D printing and digital fabrication technologies), (2) on-demand electronics, and (3) programmable intelligence in every object. The creativity and change unleashed by this revolution could fundamentally change how society operates with a return to craftsmanship, an adoption of mass customization, and new models of sharing, crowd-funding, and making.

This two-day workshop will bring together experts in 3D printing, digital fabrication, synthetic biology, printable electronics, end-user programming, manufacturing, robotics, design, healthcare, CAD/CAM, and intellectual property. The goal of this workshop is to inspire the computing community to envision future trends and opportunities within this critical emerging landscape. Where are the potential opportunities, disruptive trends, and blind spots? Are there new questions and directions that deserve greater attention by the research community and new investments in computing research?

The workshop will be held in June. For more information, please visit: http://cra.org/ccc/visioning/computing-visions-2025/new-making-renaissance.

An additional Computing Visions 2025 workshop will be occurring soon, titled **Computing and the Smart World.**

Extreme Scale Design Automation

From the CCC Blog

Josep Torrellas

The following is a special contribution to this blog by Josep Torrellas, Professor at the Departments of Computer Science and (by courtesy) Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign. He is the Director of the Center for Programmable Extreme Scale Computing, and the Director of the Illinois-Intel Parallelism Center (I2PC). Josep is a member of the Computing Community Consortium (CCC) Council.

As part of the CCC's ongoing support of visioning workshops, Alex Jones (University of Pittsburgh), Iris Bahar (Brown University), Srinivas Katkoori (University of South Florida), Patrick Madden (SUNY Binghamton), Diana Marculescu (Carnegie Mellon University), and Igor Markov (University of Michigan) have co-organized three workshops on Charting the Future of Electronic Design Automation. This series of workshops was co-sponsored by ACM SIGDA. The workshops were held in Pittsburgh, Pennsylvania, on March 7-8, 2013; in Austin, Texas, on June 1-2, 2013; and in Tampa, Florida, on February 21-22, 2014. The final report and a set of slides will soon be available.

Envisioning the Future of the Field

Device integration in silicon chips is increasing to unprecedented levels, and the trend is likely to continue for several generations. Existing Electronic Design Automation (EDA) techniques and tools cannot effectively harness the scale possible in today's chips, and are totally incapable of dealing with the types of systems that we expect within ten years. Industry roadmaps are unclear on how to move forward. It is therefore necessary to develop novel, extreme-scale EDA concepts and techniques to facilitate the effective development of electronic systems of extreme-scaleintegration complexity. In this context, these three workshops have tried to imagine the novel design methods, innovative software tools, new manufacturing technologies, and re-designed education roadmaps and industry interactions that are needed to harness the 1015-device chips possible in future commercial products.

The third workshop tried to identify the paradigms and algorithms that are needed to dramatically reduce the cost of silicon, and to attain rapid system design – including push-button technology for non-leading-edge chips. Further, many core EDA-inspired algorithms have broad applicability, and can be used in a variety of important emerging fields, such as developing software-driven System-On-Chip (SOC) systems, formally verifying cyber-physical systems (such as cars, rockets, nuclear power systems and, generally, smart infrastructure), and addressing medical-related problems (such as in computational genomics, synthetic biology, or genetic design automation).

The same workshop argued that the research community has placed a significant investment in the development of new fabrication technologies to augment or replace silicon devices. A large number of promising candidate technologies are being put forward, such as spintronics, carbon nanotubes, and memristors. However, given the current state of these technologies, silicon is unlikely to disappear or be replaced soon. Future systems will likely integrate advanced forms of traditional technologies with some of these novel technologies. Moreover, the resulting environments will require extensive ecosystems of computer-aided design tools, similar to those painstakingly developed for conventional technologies over many years.

Changing Workforce, Markets, and Education

The first two workshops focused on educating students in this field and on collaboration with the semiconductor industry. The outcomes of the discussions on education are summarized in an invited paper in MSE-2013 entitled "Scaling the Impact of EDA Education.'' The paper describes the changes required in the EDA curriculum, the strategies for engaging more students already in the computer sciences and engineering into EDA, and the methods for building a pipeline of students into EDA. One intriguing approach is to use massively open online courses (MOOCs) to reach a wide audience and to share course material.

The second workshop focused on the semiconductor industry needs and on collaboration between industry and academia. Noel Menezes from Intel gave a keynote where he outlined where the industry is heading, and the types of professionals that are needed. The workshop found that we need comprehensive strategies to handle reliability, power management, and verification.

The Visioning Workshops

Each of the three workshops had an attendance of about 30–40 people. Attendees came from universities, industry (e.g., Intel, IBM, Synopsys, Cadence, and DWave Systems), and funding agencies (e.g., NSF, SRC, and DARPA). Keynote speakers included Bob Colwell (DARPA), Patrick Groeneveld (Synopsys), Noel Menezes (Intel), Jacob White (MIT), Bill Joyner (SRC), and Rob Rutenbar (University of Illinois).

2013 Taulbee Survey

Second Consecutive Year of Record Doctoral Degree Production; Continued Strong Undergraduate CS Enrollment

By Stuart Zweben and Betsy Bizot

This article and the accompanying figures and tables present the results from the 43rd annual *CRA Taulbee Survey*[1]. The *CRA Taulbee Survey* is conducted annually by the Computing Research Association to document trends in student enrollment, degree production, employment of graduates, and faculty salaries in academic units in the United States and Canada that grant the Ph.D. in computer science (CS), computer engineering (CE) or information (I)[2]. Most of these academic units are departments, but some are colleges or schools of information or computing. In this report, we will use the term "department" to refer to the unit offering the program.

Information is gathered during the fall. Responses received by January 21, 2014 are included in the analysis. The period covered by the data varies from table to table. Degree production and enrollment (Ph.D., Master's, and Bachelor's) refer to the previous academic year (2012-13). Data for new students in all categories refer to the current academic year (2013-14). Projected student production and information on faculty salaries are also for the current academic year; salaries are those effective January 1, 2014.

We surveyed a total of 266 Ph.D.-granting departments; 179 completed the online survey form, for a response rate of 67 percent. This is lower than last year's 70 percent. The response rate from the U.S. CS departments was 77 percent this year, compared with 80 percent last year. The response rates from CE, I and Canadian departments continue to be rather low. Figure 1 shows the history of response rates to the survey. Response rates are inexact because some departments provide only partial data, and some institutions provide a single joint response for multiple departments. Thus, in some tables the number of departments shown as reporting will not equal the overall total number of respondents shown in Figure 1 for that category of department.

To account for the changes in response rate, we will comment not only on aggregate totals but also on averages per department reporting or data from those departments that responded to both this year's and last year's surveys. This is a more accurate indication of the one-year changes affecting the data.

Figure 1. Number of Respondents to the Taulbee Survey

Year	US CS Depts.	US CE Depts.	Canadian	US Information	Total
1995	110/133 (83%)	9/13 (69%)	11/16 (69%)		130/162 (80%)
1996	98/131 (75%)	8/13 (62%)	9/16 (56%)		115/160 (72%)
1997	111/133 (83%)	6/13 (46%)	13/17 (76%)		130/163 (80%)
1998	122/145 (84%)	7/19 (37%)	12/18 (67%)		141/182 (77%)
1999	132/156 (85%)	5/24 (21%)	19/23 (83%)		156/203 (77%)
2000	148/163 (91%)	6/28 (21%)	19/23 (83%)		173/214 (81%)
2001	142/164 (87%)	8/28 (29%)	23/23 (100%)		173/215 (80%)
2002	150/170 (88%)	10/28 (36%)	22/27 (82%)		182/225 (80%)
2003	148/170 (87%)	6/28 (21%)	19/27 (70%)		173/225 (77%)
2004	158/172 (92%)	10/30 (33%)	21/27 (78%)		189/229 (83%)
2005	156/174 (90%)	10/31 (32%)	22/27 (81%)		188/232 (81%)
2006	156/175 (89%)	12/33 (36%)	20/28 (71%)		188/235 (80%)
2007	155/176 (88%)	10/30 (33%)	21/28 (75%)		186/234 (79%)
2008	151/181 (83%)	12/32 (38%)	20/30 (67%)	9/19 (47%)	192/264 (73%)
2009	147/184 (80%)	13/31 (42%)	16/30 (53.3%)	12/20 (60%)	188/265 (71%)
2010	150/184 (82%)	12/30 (40%)	18/29 (62%)	15/22 (68%)	195/265 (74%)
2011	142/185 (77%)	13/31 (42%)	13/30 (43%)	16/21 (76%)	184/267 (69%)
2012	152/189 (80%)	11/32 (34%)	14/30 (47%)	16/26 (62%)	193/277 (70%)
2013	144/188 (77%)	10/30 (33%)	14/26 (54%)	11/22 (50%)	179/266 (67%)

Departments that responded to the survey were sent preliminary results about faculty salaries in December 2013; these results included additional distributional information not contained in this report. The CRA Board views this as a benefit of participating in the survey.

Degree, enrollment and faculty salary data for the U.S CS departments are stratified according to a) whether the institution is public or private, and b) the tenure-track faculty size of the reporting department. The faculty size strata deliberately overlap, so that data from most departments affect multiple strata. This may be especially useful to departments near the boundary of one stratum. Salary data also is stratified according to the population of the locale in which the institution is located.[3] These stratifications allow our readers to see multiple views of important data, and hopefully gain new insights from them. In addition to tabular presentations of data, we will use "box and whisker" diagrams to show medians, quartiles, and the range between the 10th and 90th percentile data points.

For the first time this year, we requested information about the gender and ethnicity of students enrolled in the bachelor's and master's programs. In previous years, we only requested this information for those enrolled in the doctoral programs, and for degree recipients at all levels. Also this year, we requested for the first time the cross-tabulations of gender by ethnicity at each degree level, for both degree recipients and those enrolled in the programs, and for current faculty. Thus, we now have information such as the number of White males who were enrolled in master's programs, or the number of African-American females who received bachelor's degrees in the previous year, or the fraction of female full professors who are Hispanic and how it compares with the fraction of male full professors who are Hispanic.

This year, we also requested for the first time information about the total students and total credit-hours taught by the departments during the previous fiscal year. The purpose is to help track total demand for computing education, including courses for non-majors. Beginning next year, we will report trends on this data.

We thank all respondents to this year's questionnaire. Departments that participated are listed at the end of this article.

Doctoral Degree Production, Enrollments and Employment

(Tables D1-D10; Figures D1-D6)

For the second straight year, overall Ph.D. production in computing programs reported by the Taulbee Survey reached an all-time high, with 1,991 degrees granted (Table D1, Figure D1). This surpasses last year's total of 1,929, representing a 3.2 percent increase. Since this year fewer departments responded to the survey, the actual increase likely is even greater. Indeed, among all departments reporting both this year and last year, the number of doctoral degrees increased by 7.9 percent. In U.S. CS departments, overall Ph.D. production was up 6.8 percent among those departments reporting both years. Again this past year, the average number of doctoral degrees per U.S. CS department is similar at public and private universities.

Women comprised 17.2 percent of CS doctoral graduates and 18 percent of all doctoral computing graduates (Table D2), both values being lower than those reported last year (17.8 percent and 19.2 percent, respectively). Gender diversity also was lower among the CE and I graduates; 11.2 percent of the CE graduates in 2012-13 were female, compared with 13.3 percent in 2011-12, and 39.8 percent of the I graduates in 2012-13 were female, compared with 44.9 percent in 2011-12.

The fraction of doctoral degrees that went to Non-resident Aliens continues to grow considerably, reaching over 58 percent in 2012-13 both in CS and overall (Table D3). In 2011-12, these values were about 50-51 percent. Only in I programs is the fraction of Non-resident Aliens below 50 percent, but this year's reported 39.4 percent still exceeds last year's reported 26.9 percent. The fraction of doctoral graduates who were American Indian or Alaska Native, Black or African American, Native Hawaiian/Pacific Islander, Hispanic, or Multiracial Non-Hispanic was a paltry 3.3 percent

Table D1. PhD Production and Pipeline by Department Type

Department Type	# Depts	PhDs Awarded		PhDs Next Year		Passed Qualifier		Passed Thesis (if dept has)		
		#	Avg/ Dept	#	Avg/ Dept	#	Avg/ Dept	#	# Dept	Avg/ Dept
US CS Public	105	1,230	11.7	1,339	12.8	1,300	12.4	955	81	11.8
US CS Private	36	395	11.0	446	12.4	401	11.1	210	24	8.8
US CS Total	141	1,625	11.5	1,785	12.7	1,701	12.1	1,165	105	11.1
US CE	9	92	10.2	120	13.3	95	10.6	202	7	28.9
US Info	10	65	6.5	71	7.1	54	5.4	56	7	8.0
Canadian	15	209	13.9	195	13.0	221	14.7	128	10	12.8
Grand Total	175	1,991	11.4	2,171	12.4	2,071	11.8	1,551	129	12.0

Figure D1. PhD Production

CRA Taulbee Survey 2013

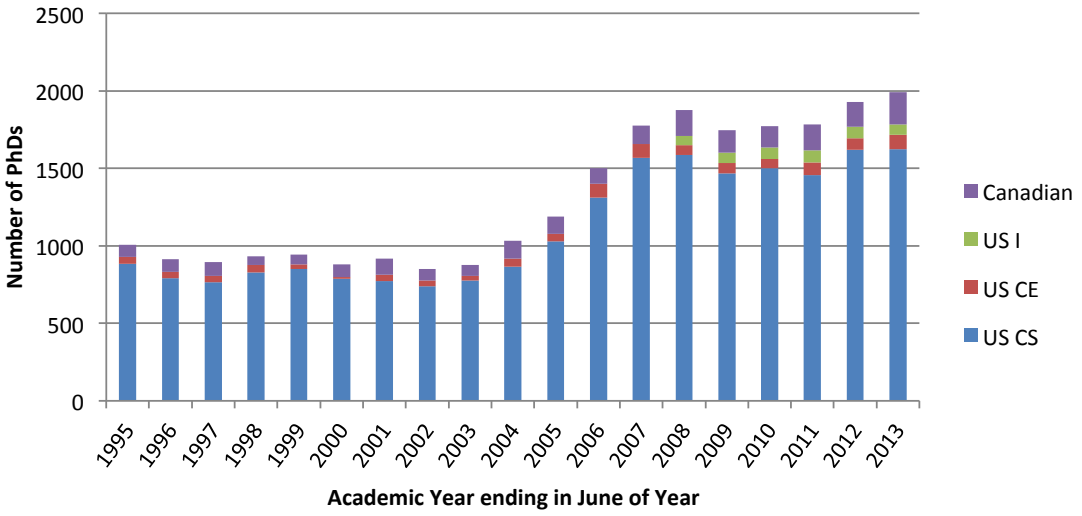


Table D2. PhDs Awarded by Gender

	CS		CE		I		Total	
Male	1,292	82.8%	183	88.8%	71	60.2%	1,546	82.0%
Female	269	17.2%	23	11.2%	47	39.8%	339	18.0%
Total Known Gender	1,561		206		118		1,885	
Gender Unknown	92		12		2		106	
Grand Total	1,653		218		120		1,991	

Table D3. PhDs Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	840	58.7%	132	66.0%	43	39.4%	1,015	58.3%
Amer Indian or Alaska Native	3	0.2%	0	0.0%	0	0.0%	3	0.2%
Asian	136	9.5%	14	7.0%	15	13.8%	165	9.5%
Black or African-American	22	1.5%	0	0.0%	2	1.8%	24	1.4%
Native Hawaiian/Pac Islander	3	0.2%	0	0.0%	0	0.0%	3	0.2%
White	406	28.4%	52	26.0%	47	43.1%	505	29.0%
Multiracial, not Hispanic	2	0.1%	0	0.0%	0	0.0%	2	0.1%
Hispanic, any race	20	1.4%	2	1.0%	2	1.8%	24	1.4%
Total Residency & Ethnicity Known	1,432		200		109		1,741	
Resident, ethnicity unknown	106		16		2		124	
Residency unknown	115		2		9		126	
Grand Total	1,653		218		120		1,991	

Table D4. Employment of New PhD Recipients By Specialty

	Artificial Intelligence	Computer-Supported Cooperative Work	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	Human-Computer Interaction	High-Performance Computing	Informatics: Biomedica/ Other Science	Information Assurance/Security	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Total	
North American PhD Granting Depts.																						
Tenure-track	6	0	14	6	7	8	1	6	8	11	5	13	2	4	2	0	4	10	4	10	121	7.7%
Researcher	4	1	3	4	1	3	1	2	1	0	1	5	1	0	2	2	1	5	2	7	46	2.9%
Postdoc	33	2	14	16	4	8	6	23	9	2	0	15	3	7	18	3	1	9	27	35	235	14.9%
Teaching Faculty	5	0	3	1	1	2	0	0	3	2	0	6	1	3	1	2	0	8	3	7	48	3.0%
North American, Other Academic																						
Other CS/CE/I Dept.	3	2	0	4	0	4	1	1	2	2	1	2	0	1	0	2	0	5	1	2	33	2.1%
Non-CS/CE/I Dept																						
North American, Non-Academic																						
Industry	74	6	62	42	53	31	37	21	27	14	17	77	42	34	34	15	12	83	44	151	876	55.5%
Government	7	0	2	3	2	3	7	4	5	1	0	1	0	1	2	2	0	1	0	5	46	2.9%
Self-Employed	5	0	3	2	0	1	0	0	1	1	0	1	1	0	0	0	1	1	0	4	21	1.3%
Unemployed	1	0	2	0	0	1	0	0	0	1	0	2	1	0	0	1	0	1	0	2	12	0.8%
Other	0	0	0	0	0	0	0	0	0	3	0	1	0	1	0	0	0	0	0	4	9	0.6%
Total Inside North America																						
	138	11	103	78	68	61	53	57	56	37	24	123	51	51	59	27	19	123	81	227	1,447	91.8%
Outside North America																						
Ten-Track in PhD	1	0	1	1	2	1	0	1	3	0	1	3	2	1	1	0	0	7	5	5	35	2.2%
Researcher in PhD	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	4	0.3%
Postdoc in PhD	4	0	0	0	0	1	1	1	1	0	0	0	0	3	1	0	1	0	6	0	19	1.2%
Teaching in PhD	0	0	1	2	1	0	0	1	1	1	1	2	0	0	0	0	0	0	1	1	12	0.8%
Other Academic	1	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	2	2	8	0.5%
Industry	6	0	4	2	2	1	2	0	0	0	0	7	0	0	2	0	1	4	3	8	42	2.7%
Government	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	4	0.3%
Other	0	1	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1	6	0.4%
Total Outside NA	12	2	7	5	6	4	4	5	6	2	3	14	2	4	4	0	2	11	17	20	130	8.2%
Total with Employment Data, Inside North America plus Outside North America																						
	150	13	110	83	74	65	57	62	62	39	27	137	53	55	63	27	21	134	98	247	1,577	
Employment Type & Location Unknown																						
	21	4	15	16	17	16	3	12	15	6	3	15	2	3	13	2	4	6	13	228	414	
Grand Total	171	17	125	99	91	81	60	74	77	45	30	152	55	58	76	29	25	140	111	475	1,991	

Table D4a. Detail of Industry Employment

	Artificial Intelligence	Computer-Supported Cooperative Work	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	Human-Computer Interaction	High-Performance Computing	Informatics: Biomedical/ Other Science	Information Assurance/Security	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Total	
Inside North America																						
Research	49	3	35	25	31	16	19	12	15	7	8	40	20	20	19	7	9	23	21	54	433	49.4%
Non-Research	10	3	14	11	13	7	6	6	4	4	6	23	12	7	7	6	3	43	8	49	242	27.6%
Postdoctorate	3	0	1	0	1	2	3	2	0	1	0	2	1	1	1	0	0	0	8	2	28	3.2%
Type Not Specified	12	0	12	6	8	6	9	1	8	2	3	12	9	6	7	2	0	17	7	46	173	19.7%
Total Inside NA	74	6	62	42	53	31	37	21	27	14	17	77	42	34	34	15	12	83	44	151	876	
Outside North America																						
Research	3	0	3	2	2	0	2	0	0	0	0	3	0	0	1	0	0	3	2	2	23	54.8%
Non-Research	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	3	7	16.7%
Postdoctorate	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	4	9.5%
Type Not Specified	1	0	1	0	0	1	0	0	0	0	0	2	0	0	1	0	0	0	0	2	8	19.0%
Total Outside NA	6	0	4	2	2	1	2	0	0	0	0	7	0	0	2	0	1	4	3	8	42	

Table D5. New PhD Students by Department Type

	CS				CE				I				Total	
Department Type	New Admit	MS to PhD	Total	Avg. per Dept.	New Admit	MS to PhD	Total	Avg. per Dept.	New Admit	MS to PhD	Total	Avg. per Dept.	Total	Avg. per Dept
US CS Public	1,412	141	1,553	16.2	104	6	110	1.1	50	3	53	0.6	1,716	17.9
US CS Private	598	28	626	17.9	11	0	11	0.3	10	1	11	0.3	648	18.5
US CS Total	2,010	169	2,179	16.6	115	6	121	0.9	60	4	64	0.5	2,364	18.0
US CE	0	0	0	0.0	71	14	85	10.6	5	0	5	0.6	90	11.3
US Information	5	3	8	0.9	0	0	0	0.0	77	2	79	8.8	87	9.7
Canadian	135	21	156	11.1	27	1	28	2.0	3	0	3	0.2	187	13.4
Grand Total	2,150	193	2,343	14.5	213	21	234	1.4	145	6	151	0.9	2,728	16.8

in 2012-13 (3.4 percent for CS doctoral graduates), even worse than the 4.1 percent (4.0 percent for CS doctoral graduates) reported for 2011-12.[4]

Crosstab information of gender by ethnicity has been collected for doctoral degrees awarded since 2004 and is provided by 100% of responding departments; crosstab information for doctoral enrollment is new this year and 91% of those departments that reported any Ph.D. enrollment data provided enrollment crosstabs (Tables D9 - D10). A smaller fraction of the men who received CS doctoral degrees (9 percent) were of unknown ethnicity as compared with the fraction of women (18 percent) who were of unknown ethnicity. Among those whose ethnicity was known, about 30 percent of the men vs. 23 percent of the women were White, while 12 percent of the women vs. 8 percent of the men were Asian.

Among currently enrolled CS doctoral students whose ethnicity is known, we see a similar spread between the percent of men and the percent of women who are White; 65 percent of these women but 60 percent of these men are Non-resident Aliens. These statistics may be reflective of several Non-resident Aliens obtaining U.S. residency status during their doctoral studies; since most Non-resident Aliens come from Asian countries, they would graduate as (resident) Asians. However, since the data for enrolled students includes all students during a five year or more period, and this is the first year that we have obtained cross-tabulations for either degrees awarded or enrollments, it will take a few more years before any such conclusion can be drawn confidently.

Among those pursuing CE doctoral degrees, 22 percent of the men but only 12 percent of the women are White, while 86 percent of the women but only 75 percent of the men are either Non-resident Aliens or Asians. There are no appreciable differences in the percentage of men vs the percentage of women in the ethnicity categories among those pursuing I doctoral degrees.

The number of students per department who passed qualifier exams during 2012-13 in U.S. CS departments is slightly lower average per department than was reported last year among public departments, but a higher average per department than was reported last year among private departments. The number per department who passed thesis candidacy exams (most, but not all, departments have such exams) decreased among U.S. CS public departments and remained constant among U.S. private departments (Table D1).

The number of new Ph.D. students in fall 2013 decreased compared with fall 2012 (Table D5, Table 1). Among all departments that reported both years, the number of new Ph.D. students declined 6.4 percent. If only U.S. CS departments that reported both years are considered, the decline was 8.1 percent. Decreases mainly were

Table D5a. New PhD Students from Outside North America

Department Type	CS	CE	I	Total New Outside	Total New	% outside North America
US CS Public	994	77	17	1,088	1,716	63.4%
US CS Private	329	8	5	342	648	52.8%
Total US CS	1,323	85	22	1,430	2,364	60.5%
US CE	0	60	3	63	90	70.0%
US Info	3	0	51	54	87	62.1%
Canadian	78	14	2	94	187	50.3%
Grand Total	1,404	159	78	1,641	2,728	60.2%

Table D6. PhD Enrollment by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	100	8,106	66.2%	518	37.3%	477	47.5%	9,101	62.2%
US CS Private	35	2,959	24.2%	69	5.0%	82	8.2%	3,110	21.2%
Total US CS	135	11,065	90.3%	587	42.3%	559	55.7%	12,211	83.4%
US CE	9	10	0.1%	682	49.2%	19	1.9%	711	4.9%
US Info	9	29	0.2%	0	0.0%	398	39.6%	427	2.9%
Canadian	15	1,143	9.3%	118	8.5%	28	2.8%	1,289	8.8%
Grand Total	168	12,247		1,387		1,004		14,638	

present in U.S. public CS departments and in Canadian departments. There was an increase again in the proportion of new doctoral students from outside North America. The proportion for fall 2013 is 60.2 percent while that reported for fall 2012 was 57.4 percent. U.S. public CS departments and I departments had increases, while Canadian departments had a decline, and US CE and US private CS departments had slight declines.

Among programs that reported both years, total doctoral enrollment fell 1.4 percent. If only U.S. computer science departments are considered, the decrease was 1.2 percent. Total doctoral enrollment by gender is in about the same proportion reported last year, except in I programs where there was a decline in the proportion of women (Table D7). There is very little change in the fraction of doctoral students who are not either Non-resident Aliens, Asian or White (Table D8).

Figure D5 shows a graphical view of the Ph.D. pipeline for computer science programs. The data in this graph are normalized by the number of departments reporting. The graph offsets the qualifier data by two years from the data for new students, and offsets the graduation data by five years from the data for new students. These data have been useful in estimating the timing of changes in production rates. The graph suggests that doctoral production will be leveling off during the next few years, though for the coming year, at least, the departments are forecasting continued increased production.

Figure D6 shows the employment trend of new Ph.D.s in academia and industry, those taking employment outside of North America, and those going to academia who took positions in departments other than Ph.D.-granting CS/CE departments. Table D4 shows a more detailed breakdown of the employment data for new Ph.D.s. The fraction of new Ph.D.s who took positions in North American industry remained at 55.5 percent in 2012-13, near the historic high of 56.6 percent, set in 2007-08. This year, we also asked for information about whether or not these industry positions were research positions. Table D4a reports that breakdown. By almost a two-to-one margin, doctoral graduates who went to North American industry took research positions, though it should be noted that definitive data was provided for only 80 percent of these graduates.

Table D7. PhD Enrollment by Gender

	CS		CE		I		Total	
Male	9,942	81.5%	1,171	84.4%	643	64.6%	11,756	80.6%
Female	2,264	18.5%	216	15.6%	352	35.4%	2,832	19.4%
Total Known Gender	12,206		1,387		995		14,588	
Gender Unknown	41		0		9		50	
Grand Total	12,247		1,387		1,004		14,638	

Table D8. PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	6,679	60.7%	891	68.5%	410	42.0%	7,980	60.1%
Amer Indian or Alaska Native	15	0.1%	1	0.1%	2	0.2%	18	0.1%
Asian	648	5.9%	99	7.6%	127	13.0%	874	6.6%
Black or African-American	145	1.3%	19	1.5%	34	3.5%	198	1.5%
Native Hawaiian/Pac Islander	11	0.1%	2	0.2%	10	1.0%	23	0.2%
White	3,268	29.7%	256	19.7%	359	36.7%	3,883	29.3%
Multiracial, not Hispanic	48	0.4%	10	0.8%	15	1.5%	73	0.5%
Hispanic, any race	184	1.7%	22	1.7%	20	2.0%	226	1.7%
Total Known	10,998		1,300		977		13,275	
Resident, ethnicity unknown	514		80		22		616	
Residency unknown	735		7		5		747	
Grand Total	12,247		1,387		1,004		14,638	

Figure D2. Nonresident Aliens as Fraction of PhD Enrollments

CRA Taulbee Survey 2013

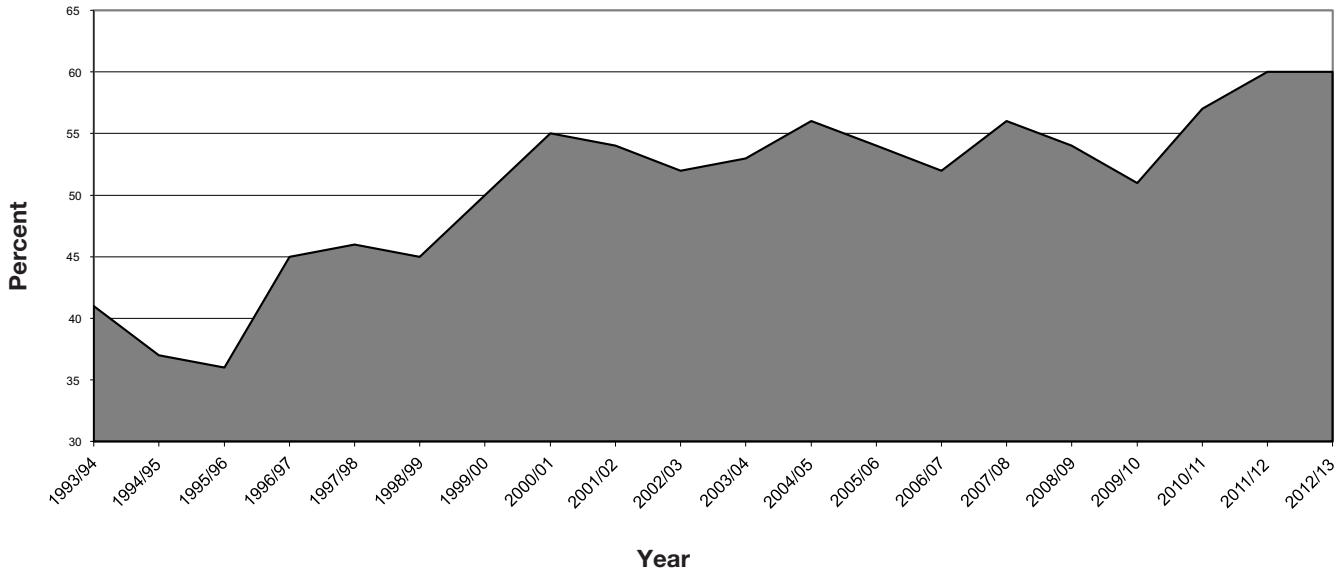


Table D9. PhDs Awarded by Gender and Ethnicity, From 175 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	694	131	15	59	60	113	17	2	67	81	26	17		41	37	1,015	58.3
Amer Indian or Alaska Native	3	0	0	0	0	0	0	0	0	0	0	0		0	0	3	0.2
Asian	98	27	11	8	12	12	2	0	7	10	6	9	0	10	20	165	9.5
Black or African-American	12	7	3	1	3	0	0	0	0	0	2	0	0	3	0	24	1.4
Native Hawaiian/ Pac Islander	3	0	0	0	0	0	0	0	0	0	0	0		0	0	3	0.2
White	349	51	6	30	23	42	2	8	25	10	28	19		44	41	505	29.0
Multiracial, not Hispanic	2	0	0	0	0	0	0	0	0	0	0	0		0	0	2	0.1
Hispanic, any race	16	4	0	1	2	2	0	0	1	0	1	1		2	2	24	1.4
Total Res & Ethnicity Known	1,177	220	35			169	21	10			63	46	0			1,741	
Resident, ethnicity unknown	56	14	36			13	1	2			1	1				124	
Not Reported (N/R)	59	35	21			1	1				7	0	2			126	
Gender Totals	1,292	269	92			183	23	12			71	47	2			1,991	
%	82.8%	17.2%				88.8%	11.2%				60.2%	39.8%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure D3. PhD Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2013

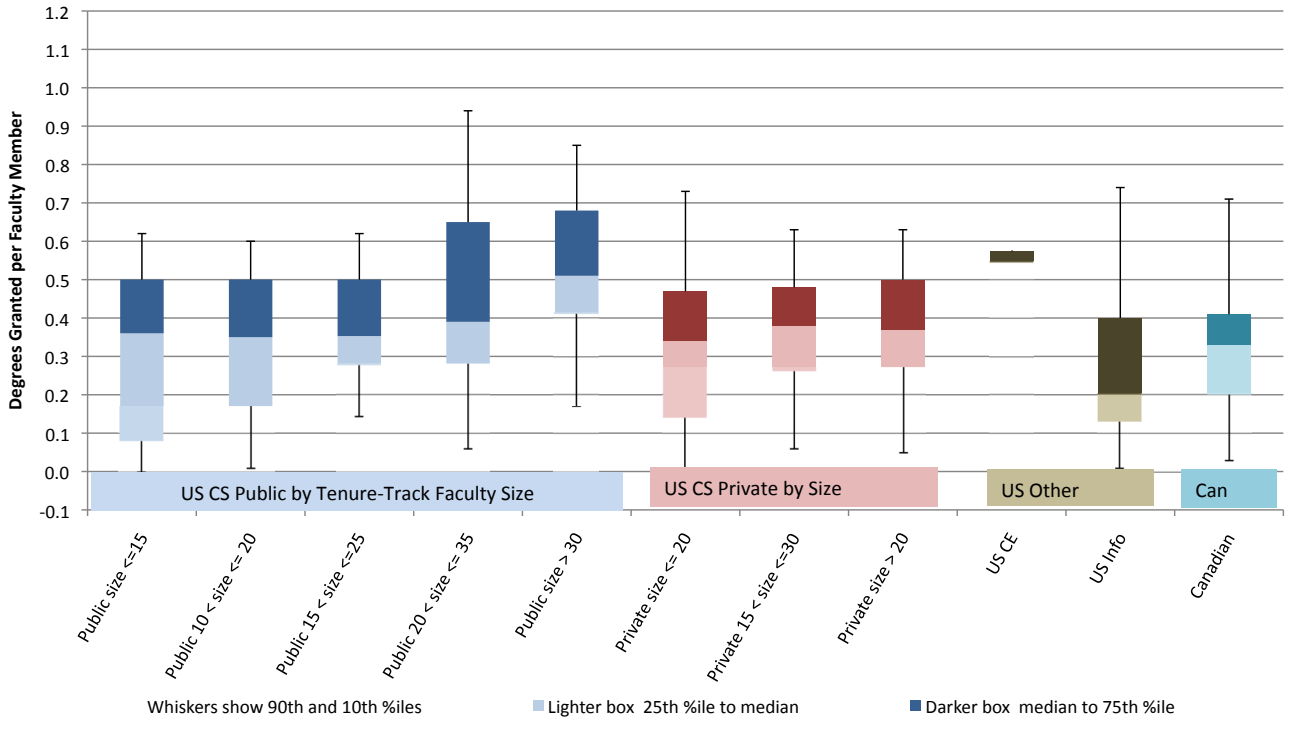


Figure D4. PhD Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2013

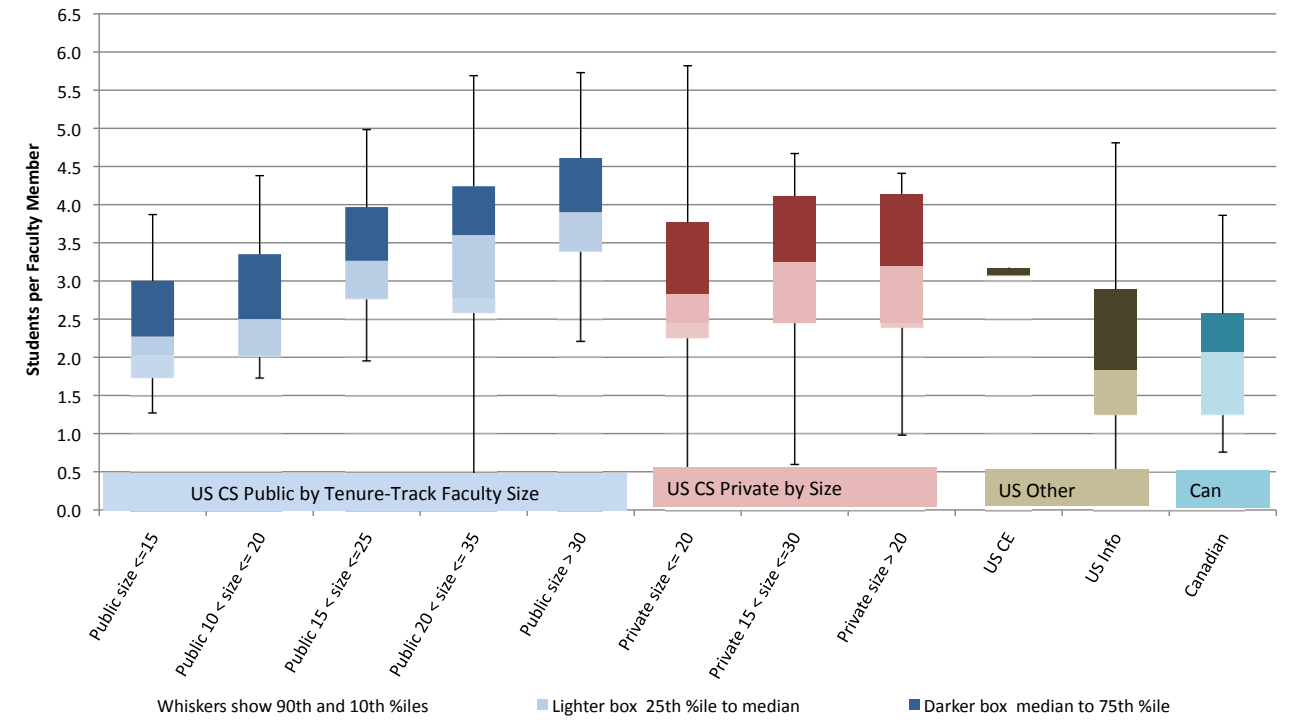


Figure D5. CS Pipeline corrected for year of entry

CRA Taulbee Survey 2013

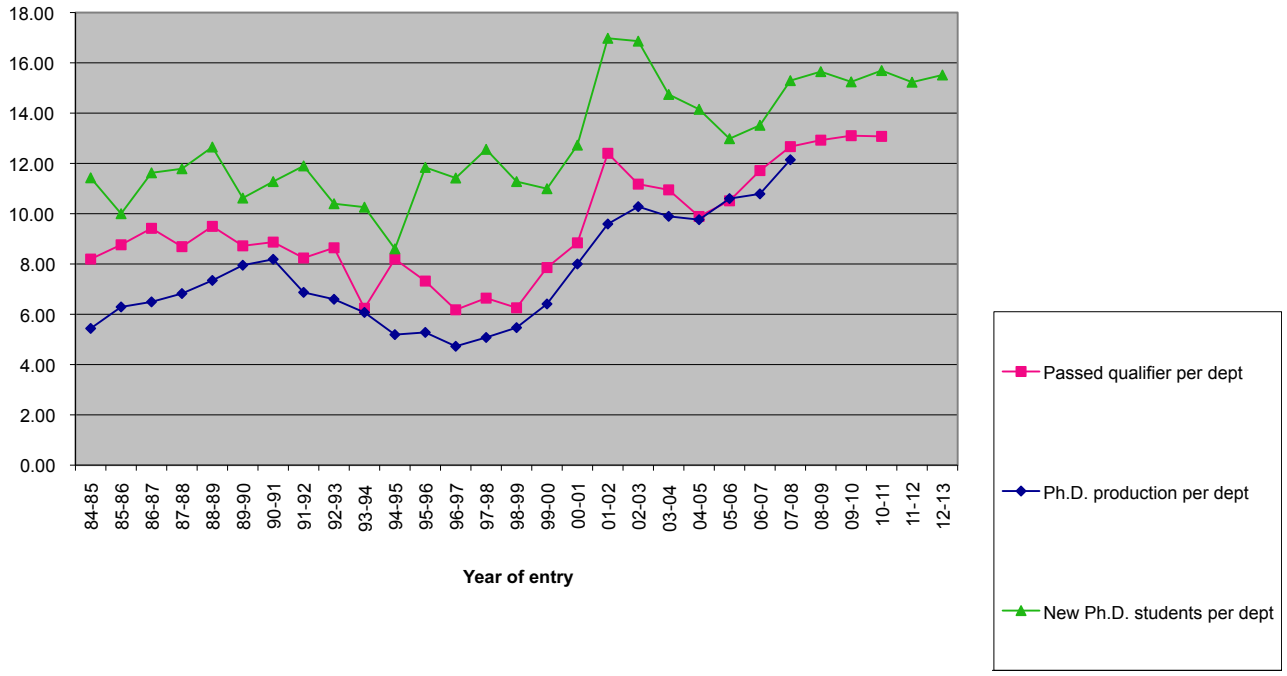
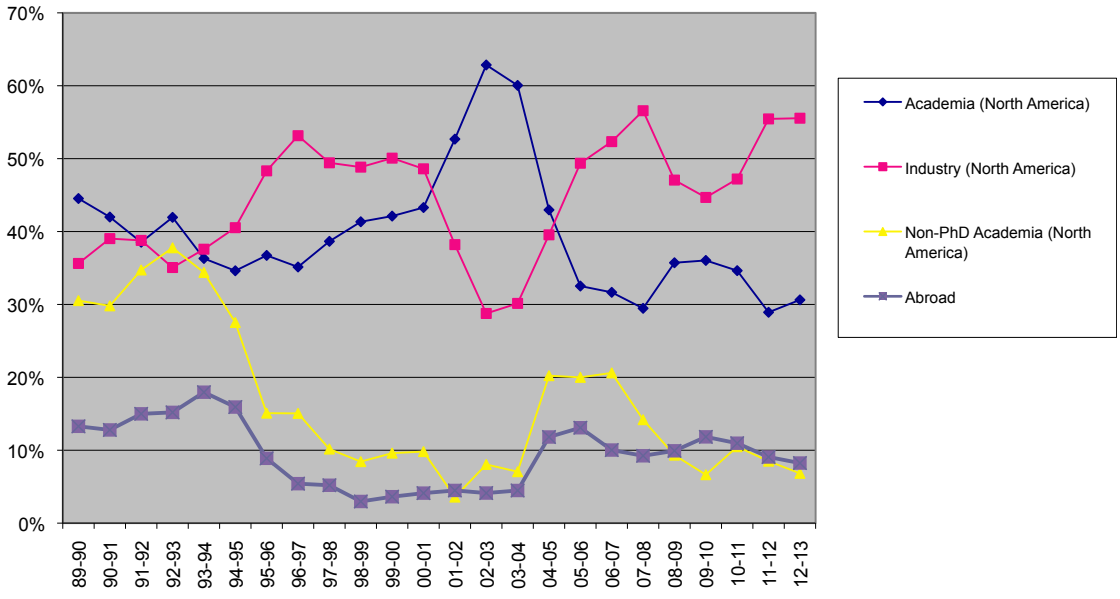


Figure D6. Employment of New Ph.D.s in U.S. and Canada

CRA Taulbee Survey 2013



A slightly larger fraction (30.6 percent) of 2012-13 graduates took North American academic jobs as compared with 2011-12 graduates (29.1 percent). The fraction taking tenure-track positions in North American doctoral granting computing departments rose to 7.7 percent for 2012-13 graduates, from 6.6 percent for 2011-12 graduates. The fraction taking positions in North American non-Ph.D.-granting computing departments dropped again, from 2.5 percent for 2011-12 graduates to 2.1 percent for 2012-13 graduates. The fraction taking North American academic postdoctoral positions increased from 13.4 percent to 14.9 percent.

The proportion of Ph.D. graduates who were reported taking positions outside of North America, among those whose employment is known, declined again, to 8.2 percent from 9.1 percent for 2011-12 graduates. About 1/3 of those employed outside of North America went to industry (similar to last year's reported fraction), about 27 percent went to tenure-track academic positions (a higher rate than reported last year) and less than 15 percent went to academic postdoctoral positions (a lower rate than reported last year). Of the doctoral graduates who went to non-North American industry positions, the positions were research by a three-to-one margin over those that were not research. Similar to the North American breakdown, definitive data was provided for only 81 percent of these graduates.

This year, we also requested identification of graduates who went to industry postdoctoral positions. They are included in the overall industry numbers. When academic and industry postdocs are combined, the result is that 18.1 percent of 2012-13 doctoral graduates took some type of postdoctoral position. Approximately one-ninth of these were industry postdocs.

The unemployment rate for new Ph.D.s again this year was below one percent, though it rose somewhat from the reported rate for 2011-12 graduates. The fraction of new Ph.D.s whose employment status was unknown was 20.8 percent in 2012-13; in 2011-12 it was 17.7 percent. It is possible that the lack of information about the employment of more than one in six graduates skews the real overall percentages for certain employment categories.

Table D4 also indicates the areas of specialty of new Ph.D.s. Artificial intelligence, networking and software engineering continue to be the most popular areas of specialization for doctoral graduates. Databases, and theory and algorithms again were the next most popular areas.

Table D10. PhD Enrollment by Gender and Ethnicity, From 153 Departments Providing Breakdown Data

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	5,077	1,223	0	60	65	730	144	0	68	73	229	135	0	41	43	7,538	60.2
Amer Indian or Alaska Native	13	2	0	0	0	1	0	0	0	0	1	1	0	0	0	18	0.1
Asian	472	136	0	6	7	70	27	0	7	14	67	41	9	12	13	822	6.6
Black or African-American	91	49	0	1	3	16	2	0	1	1	23	10	0	4	3	191	1.5
Native Hawaiian/ Pac Islander	10	1	0	0	0	2	0	0	0	0	6	4	0	1	1	23	0.2
White	2,624	449	0	31	24	232	24	0	22	12	209	106	0	38	34	3,644	29.1
Multiracial, not Hispanic	36	9	0	0	0	1	0	0	0	0	6	7	0	1	2	59	0.5
Hispanic, any race	157	20	0	2	1	21	1	0	2	1	11	8	0	2	3	218	1.7
Total Res & Ethnicity Known	8,480	1,889	0			1,073	198	0			552	312	9			12,513	
Resident, ethnicity unknown	360	76	41			66	14	0			15	6	0			578	
Not Reported (N/R)	25	5	0			4	1	0			0	0	0			35	
Gender Totals	8,865	1,970	41			1,143	213	0			567	318	9			13,126	
%	81.8%	18.2%				84.3%	15.7%				64.1%	35.9%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Master's and Bachelor's Degree Production and Enrollments

This section reports data about enrollment and degree production for Master's and Bachelor's programs in the doctoral-granting departments. Although the absolute number of degrees and enrolled students reported herein only reflect departments that offer the doctoral degree, the trends observed in the master's and bachelor's data from these departments tend to strongly reflect trends in the larger population of programs that offer such degrees.

Master's (Tables M1-M8; Figures M1-M2)

On a per-department basis, master's degree production in CS increased in 2012-13. However, there was increased production among U.S. private departments, while U.S. public departments were unchanged.

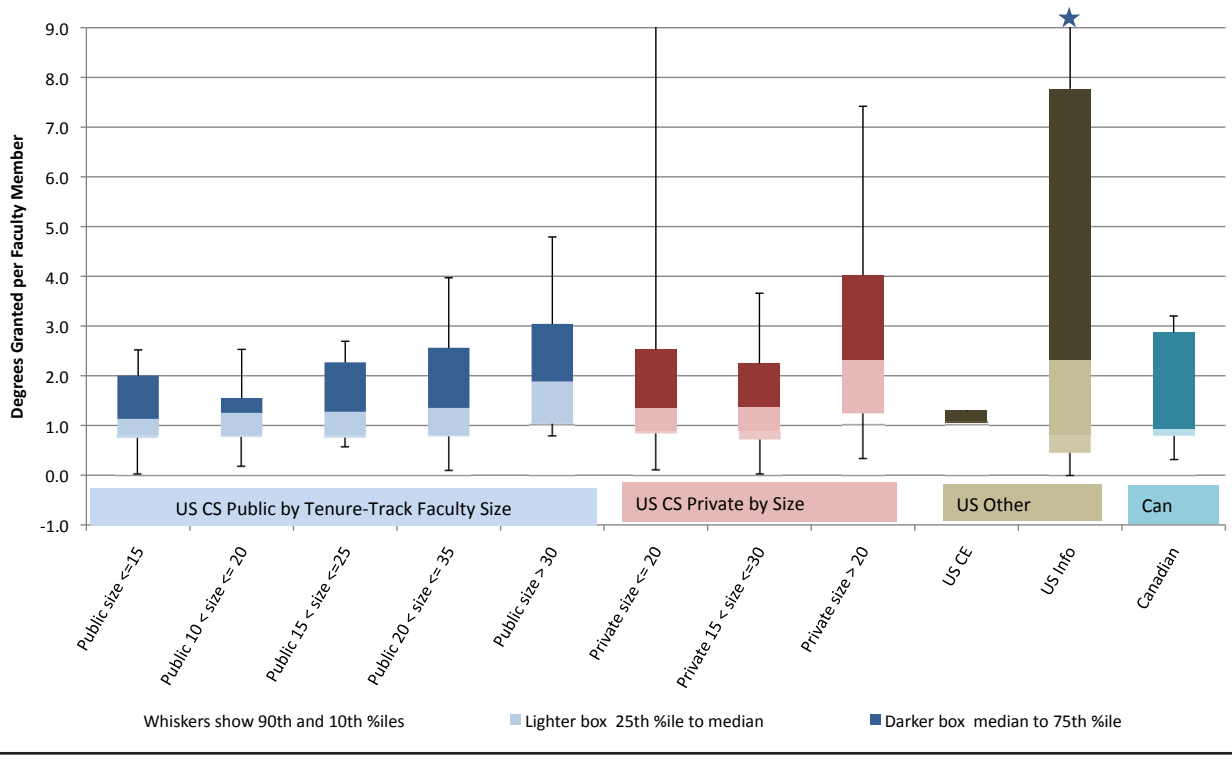
Overall production of master's degrees in the information area rose in 2012-13. Both U.S. pubic and U.S. private CS departments reported substantial increases in the number of information Master's degrees produced, while information departments reported decreased production of information master's degrees.

Table M1. Master's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	98	3,855	53.5%	260	35.0%	832	35.0%	4,947	47.9%
US CS Private	34	2,845	39.5%	65	8.8%	439	18.5%	3,349	32.4%
Total US CS	132	6,700	93.0%	325	43.8%	1271	53.4%	8,296	80.3%
US CE	8	0	0.0%	304	41.0%	0	0.0%	304	2.9%
US Info	8	34	0.5%	0	0.0%	927	39.0%	961	9.3%
Canadian	15	471	6.5%	113	15.2%	181	7.6%	765	7.4%
Grand Total	163	7,205		742		2,379		10,326	

Figure M1. Master's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2013



The proportion of female graduates among both computer science and information master's degree recipients decreased in 2012-13. In CS, the decrease was from 22.6 percent to 21.2 percent, while in the information area the decrease was from 51.7 percent to 47.1 percent. This was the second consecutive year of a decrease of more than one percent in the proportion of female CS master's graduates.

In both CS and information, a higher fraction of the master's recipients were Non-resident Aliens in 2012-13 as compared with 2011-12. In CS, 65 percent of the master's degrees went to Non-resident Aliens, compared with 62.3 percent in 2011-12. In the information area, the corresponding percentages were 21.9 in 2012-13 and 19.8 in 2011-12. In both CS and I, the fraction of master's degrees going to resident Asians also rose.

Among departments reporting master's degree data, 90% provided the newly-requested gender by ethnicity breakdown for degrees awarded and 88% provided the breakdown for enrollment (Tables M7 - M8). Among CS master's degree recipients whose ethnicity was known, 26 percent of the

Table M2. Master's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	5,629	78.8%	543	75.6%	1,226	52.9%	7,398	72.7%
Female	1,518	21.2%	175	24.4%	1,092	47.1%	2,785	27.3%
Total Known Gender	7,147		718		2,318		10,183	
Gender Unknown	58		24		61		143	
Grand Total	7,205		742		2,379		10,326	

Table M3. Master's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	4,245	65.0%	434	66.7%	448	24.9%	5,127	57.1%
Amer Indian or Alaska Native	9	0.1%	3	0.5%	4	0.2%	16	0.2%
Asian	556	8.5%	53	8.1%	199	11.1%	808	9.0%
Black or African-American	65	1.0%	7	1.1%	106	5.9%	178	2.0%
Native Hawaiian/Pac Island	4	0.1%	0	0.0%	4	0.2%	8	0.1%
White	1,521	23.3%	137	21.0%	934	51.9%	2,592	28.9%
Multiracial, not Hispanic	54	0.8%	6	0.9%	29	1.6%	89	1.0%
Hispanic, any race	78	1.2%	11	1.7%	76	4.2%	165	1.8%
Total Residency & Ethnicity Known	6,532		651		1,800		8,983	
Resident, ethnicity unknown	246		84		134		464	
Residency unknown	427		7		445		879	
Grand Total	7,205		742		2,379		10,326	

Table M4. Master's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	98	3,867	56.4%	308	45.8%	538	28.3%	4,713	50.0%
US CS Private	34	2,652	38.7%	71	10.6%	391	20.6%	3,114	33.0%
Total US CS	132	6,519	95.0%	379	56.4%	929	48.8%	7,827	83.0%
US CE	8	0	0.0%	290	43.2%	0	0.0%	290	3.1%
US Info	8	39	0.6%	0	0.0%	967	50.8%	1,006	10.7%
Canadian	15	303	4.4%	3	0.4%	6	0.3%	312	3.3%
Grand Total	163	6,861		672		1,902		9,435	

men and only 13 percent of the women were White, while 75 percent of the women and 63 percent of the men were Non-resident Aliens. Similar relationships were observed among those receiving CE master's degrees. However, among I master's degree recipients whose ethnicity was known, 58 percent of women vs. 43 percent of men were White, while 30 percent of men and 21 percent of women were Non-resident Aliens, and 14 percent of men and 9 percent of women were Asians. Enrollment among master's students shows the same direction of differences between percentage of men and percentage of women in all three degree areas (CS, CE, and I). However, in I programs the amount of difference between percentage of men and percentage of women is much smaller for enrollments than it is for degrees awarded.

Again this fall, there were large increases in the number of new master's students enrolled in both U.S. CS public and U.S. CS private departments. Considerable increases at both types of U.S. CS departments exist not only for CS master's programs but also for I programs in these departments. Information departments also reported larger numbers of new master's students in their I programs, on average. These increases should be reflected in degree production statistics in the very near future.

Roughly two-thirds of the new master's students in U.S. CS departments (whether public or private), and in CE and Canadian departments, are reported to be from outside North America. This is an increase of about seven percentage points over last year's reported numbers. In the information area, the fraction of new master's students is slightly over one-third, but that also is an increase of nearly seven percentage points over last year's figure. The entire increase in overall numbers of new CS and I master's students can be accounted for by the increased number of non-North American students.

Table M5. New Master's Students by Department Type

Department Type	CS			CE			I			Total			Outside North America	
	Total	# Depts	Avg / Dept	Total	# Depts	Avg / Dept	Total	# Dept	Avg / Dept	Total	# Dept	Avg / Dept	Total	%
US CS Public	3,638	99	36.7	303	19	15.9	578	11	52.5	4,519	99	45.6	3,108	68.8%
US CS Private	2,968	34	87.3	102	7	14.6	326	4	81.5	3,396	34	99.9	2,394	70.5%
Total US CS	6,606	133	49.7	405	26	15.6	904	15	60.3	7,915	133	59.5	5,510	69.6%
US CE	0	0		298	7	42.6	0	0		298	7	42.6	198	66.4%
US Info	35	1		0	0		943	8	117.9	978	9	108.7	355	36.3%
Canadian	477	13	36.7	177	2	88.5	30	1		684	13	52.6	454	66.4%
Grand Total	7,118	147	48.4	880	35	25.1	1,877	24	78.2	9,875	162	61.0	6,517	66.0%

Table M6. Total Master's Enrollment by Department Type

Department Type	CS			CE			I			Total		
	Total	# Depts	Avg / Dept	Total	# Depts	Avg / Dept	Total	# Dept	Avg / Dept	Total	# Dept	Avg / Dept
US CS Public	8,162	95	85.9	668	18	37.1	1,379	14	98.5	10,209	95	107.5
US CS Private	6,010	32	187.8	129	6	21.5	2,011	7	287.3	8,150	32	254.7
Total US CS	14,172	127	111.6	797	24	33.2	3,390	21	161.4	18,359	127	144.6
US CE	0	0		1,023	8	127.9	0	0		1,023	8	127.9
US Info	85	1		0	0		2,108	8	263.5	2,193	8	274.1
Canadian	1,664	13	128.0	131	2	65.5	72	1		1,867	13	143.6
Grand Total	15,921	141	112.9	1,951	34	57.4	5,570	30	185.7	23,442	156	150.3

Table M7. Masters Degrees Awarded by Gender and Ethnicity, From 147 Departments Providing Breakdown Data

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	3,135	1,018	9	62	75	306	115	0	65	76	284	162	0	30	21	5,029	57.6
Amer Indian or Alaska Native	4	4	0	0	0	3	0	0	1	0	3	1	0	0	0	15	0.2
Asian	400	133	0	8	10	31	15	0	7	10	127	72	0	14	9	778	8.9
Black or African-American	54	10	0	1	1	5	2	0	1	1	58	42	0	6	5	171	2.0
Native Hawaiian/ Pac Islander	4	0	0	0	0	0	0	0	0	0	3	1	0	0	0	8	0.1
White	1,312	174	0	26	13	111	18	0	24	12	405	456	0	43	58	2,476	28.4
Multiracial, not Hispanic	48	3	3	1	0	6	0	0	1	0	14	15	0	2	2	89	1.0
Hispanic, any race	66	10	0	1	1	9	2	0	2	1	38	35	0	4	4	160	1.8
Total Res & Ethnicity Known	5,023	1,352	12			471	152	0			932	784	0			8,726	
Resident, Ethnicity Unknown	192	46	0			62	22	0			70	53	4			449	
Not Reported (N/R)	40	20	0			0	0	0			98	164	0			322	
Gender Totals	5,255	1,418	12			533	174	0			1,100	1,001	4			9,497	
%	78.8%	21.2%				75.4%	24.6%				52.4%	47.6%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure M2. Master's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2013

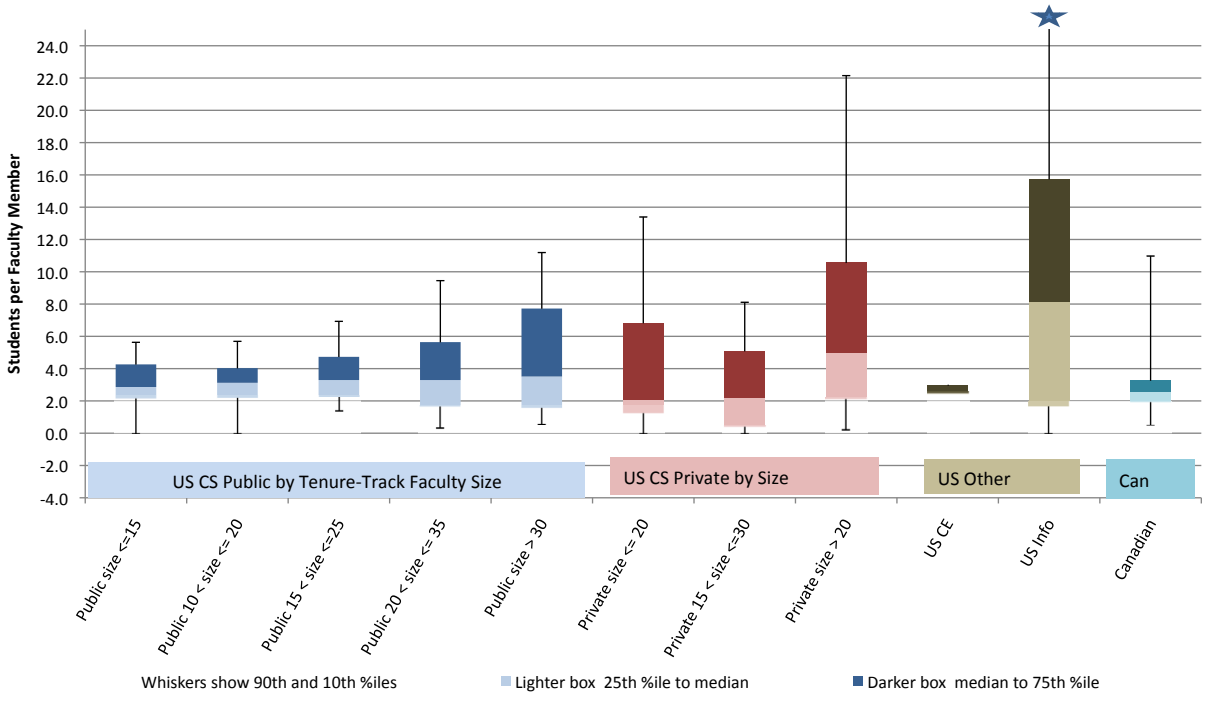


Table M8. Masters Enrollment by Gender and Ethnicity, From 139 Departments Providing Breakdown Data

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	6,277	2,166	1	59	73	890	319	0	64	78	855	545	0	32	28	11,053	55.4
Amer Indian or Alaska Native	27	7	0	0	0	1	1	0	0	0	6	4	0	0	0	46	0.2
Asian	629	226	0	6	8	96	34	0	7	8	217	144	8	8	7	1,354	6.8
Black or African-American	162	66	0	2	2	18	1	0	1	0	222	161	0	8	8	630	3.2
Native Hawaiian/ Pac Islander	26	4	0	0	0	0	0	0	0	0	6	2	0	0	0	38	0.2
White	3,176	438	1	30	15	300	38	0	22	9	1,123	972	15	42	50	6,063	30.4
Multiracial, not Hispanic	62	14	0	1	0	42	10	0	3	2	46	23	0	2	1	197	1.0
Hispanic, any race	233	30	1	2	1	42	8	0	3	2	186	86	1	7	4	587	2.9
Total Res & Ethnicity Known	10,592	2,951	3			1,389	411	0			2,661	1,937	24			19,968	
Resident, Ethnicity Unknown	361	77	0			56	15	0			176	125	2			812	
Not Reported (N/R)	93	32	21			8	12	0			26	7	0			199	
Gender Totals	11,046	3,060	24			1,453	438	0			2,863	2,069	26			20,979	
%	78.3%	21.7%				76.8%	23.2%				58.0%	42.0%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Bachelor's (Tables 1, B1-B8; Figures B1-B4)

After three straight years of double-digit percentage increases, bachelor's degree production increased by a smaller amount from 2011-12. When comparing all departments reporting this year to all departments reporting last year, there was an increase of only 1.2 percent, but this largely is due to the decreased response rate. If only those departments who reported both years are counted, the increase was 7.8 percent. In U.S. computer science departments there was a 3.7 percent increase overall but a 9.4 percent increase among those departments that reported both years[5].

The smaller growth in 2012-13 degree production might have been predicted by the fact that the Taulbee Survey reported very little change in the number of new CS majors among U.S. CS departments between fall 2009 and fall 2010. CS students in the U.S. CS departments comprise well over half of the total bachelor's students reported in the survey, and it takes about three years to graduate a typical newly declared major. Yet even with relatively flat new enrollment three years earlier, we see reasonable growth in degree production now. Only in I departments is there evidence of no degree increase once response rate is taken into account.

The much larger increases observed in new enrollment since 2010 bode well for future increases in undergraduate computing degree production. Indeed, this year's reporting departments forecast more than a 25 percent increase in CS degree production, between 2 and 3 percent increase in CE degrees, and approximately a 9 percent increase in I degrees.

U.S. CS departments at public universities tended to have a slightly larger rate of bachelor's degree production per faculty member than did those at private universities. Larger U.S. CS departments also tended to produce more bachelor's degrees per faculty member than did smaller departments (Figure B3).

When comparing the 2012-13 bachelor's degree data with that of 2010-11[6], we see that the fraction of women among bachelor's graduates increased in CS, from 11.7 percent in 2010-11 to 14.2 percent in 2012-13. There was a slight drop during this period in the fraction of women receiving CE and I degrees (from 11.8 percent to 11.6 percent in CE and 19.6 percent to 18.7 percent in I). The fraction of CS bachelor's degrees awarded to Whites declined from 66.9 percent in 2010-11 to 61.2 percent in 2012-13. Increases in the fraction of degrees awarded were present for Non-resident Aliens (7.0 percent to 8.3 percent), Asians (14.8 percent to 18.4 percent),

and Hispanics (5.4 percent to 6.0 percent). Smaller increases were present among Black and Multiracial graduates. The direction of change was similar for I degrees with the exception of Asians, which declined slightly between 2010-11 and 2012-13. In CE, there was a big increase during this two-year period in the fraction of Asians receiving degrees, while the other major categories of ethnicity experienced declines. In aggregate across the three degree areas, 60.6 percent of the graduates were White, 18.8 percent Asian, 7.6 percent Non-resident Aliens, and 13.0 percent all other ethnicity categories combined.

Among departments reporting bachelor's degree data, 83% provided the newly-requested gender by ethnicity breakdown for degrees awarded and 80% provided the breakdown for enrollment. (Tables B7 - B8) Among CS bachelor's degree recipients whose ethnicity was known, 64 percent of men and 50 percent of women were White, while 16 percent of men and 24 percent of women were Asian. Among CE degree recipients, there also was a greater percentage of men (57 percent) than women (37 percent) who were White, and a smaller percentage of men (25 percent) than women (38 percent) who were Asian. For I degree recipients, the corresponding percentages were 67 percent of men and

Table 1. Degree Production and Enrollment Change From Previous Year

	Total						Only Departments Responding Both Years					
	US CS Only			All Departments			US CS Only			All Departments		
PhDs	2012	2013	% chg	2012	2013	% chg	2012	2013	% chg	2012	2013	% chg
# Departments	149	135	-9.4%	186	168	-9.7%	129	129		159	159	
PhD Awarded	1,617	1,625	0.5%	1,929	1,991	3.2%	1,495	1,596	6.8%	1,777	1,917	7.9%
PhD Enrollment	13,208	12,211	-7.5%	15,648	14,638	-6.5%	12,121	11,977	-1.2%	14,316	14,117	-1.4%
New PhD Enroll	2,696	2,358	-12.5%	3,064	2,728	-11.0%	2,518	2,315	-8.1%	2,827	2,645	-6.4%
Bachelor's	2012	2013	% chg	2012	2013	% chg	2012	2013	% chg	2012	2013	% chg
# Departments	141	131	-7.1%	173	158	-8.7%	123	123		146	146	
BS Awarded	12,055	12,503	3.7%	14,901	15,087	1.2%	10,674	11,679	9.4%	13,094	14,112	7.8%
BS Enrollment	56,307	63,873	13.4%	67,850	77,653	14.4%	49,564	60,453	22.0%	59,867	72,487	21.1%
New BS Majors	17,041	17,348	1.8%	20,618	21,626	4.9%	14,175	16,122	13.7%	17,180	19,549	13.8%
BS Enroll/Dept	399.3	487.6	22.1%	392.2	491.5	25.3%	403.0	491.5	22.0%	410.0	496.5	21.1%

Table B1. Bachelor's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	97	7,175	66.6%	1,423	66.0%	998	46.3%	9,596	63.6%
US CS Private	34	2,274	21.1%	204	9.5%	429	19.9%	2,907	19.3%
Total US CS	131	9,449	87.7%	1,627	75.5%	1,427	66.2%	12,503	82.9%
US CE	7	0	0.0%	429	19.9%	0	0.0%	429	2.8%
US Info	7	160	1.5%	0	0.0%	702	32.6%	862	5.7%
Canadian	12	1,167	10.8%	99	4.6%	27	1.3%	1,293	8.6%
Grand Total	157	10,776		2,155		2,156		15,087	

Table B2. Bachelor's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	9,116	85.8%	1,852	88.4%	1,747	81.3%	12,715	85.5%
Female	1,511	14.2%	243	11.6%	402	18.7%	2,156	14.5%
Total Known Gender	10,627		2,095		2,149		14,871	
Gender Unknown	149		60		7		216	
Grand Total	10,776		2,155		2,156		15,087	

51 percent of women who were White, and 12 percent of men and 19 percent of women who were Asian. Among I degree recipients, 14 percent of the women but only 6 percent of the men were Black. Enrollment patterns in bachelor's programs mirror the degree recipient patterns with respect to direction of differences in percent of men and percent of women within these major ethnicity groups.

The number of new undergraduate computing majors rose for the sixth straight year. Even with the reduced response rate, the total number of new undergraduate majors rose 4.9 percent when all respondents are compared, and rose 13.8 percent among those departments reporting both this year and last year. Among U.S. computer science departments, the increase was 1.8 percent overall and 13.7 percent among departments reporting both this year and last year. Total undergraduate enrollment in computing majors among U.S. CS departments increased 13.4 percent in aggregate, and 22.0 percent among departments reporting both this year and last year.

Again in 2012-13, bachelor's level enrollment at public universities on a per faculty member basis was about twice as large as it is at private universities. At public universities, larger departments tended to have a slightly lower enrollment per faculty member than did smaller departments, while the reverse seemed to be true at private universities (Figure B4).

Aggregate total enrollment in CS, CE and I programs all increased. New student enrollment in computer science increased in Canadian departments and in U.S. CS private departments. New student enrollment in I programs decreased in all categories of U.S. departments. The changes in Canadian, CE and I departments are more volatile due to the small number of departments reporting in each of these areas.

Table B3. Bachelor's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	698	8.3%	130	7.7%	80	4.2%	908	7.6%
Amer Indian or Alaska Native	22	0.3%	5	0.3%	6	0.3%	33	0.3%
Asian	1,545	18.4%	446	26.3%	260	13.5%	2,251	18.8%
Black or African-American	322	3.8%	67	3.9%	154	8.0%	543	4.5%
Native Hawaiian/Pac Islander	22	0.3%	7	0.4%	4	0.2%	33	0.3%
White	5,131	61.2%	922	54.3%	1,225	63.6%	7,278	60.6%
Multiracial, not Hispanic	141	1.7%	23	1.4%	17	0.9%	181	1.5%
Hispanic, any race	499	6.0%	98	5.8%	181	9.4%	778	6.5%
Total Residency & Ethnicity Known	8,380		1,698		1,927		12,005	
Resident, ethnicity unknown	498		86		81		665	
Residency unknown	1898		371		148		2,417	
Grand Total	10,776		2,155		2,156		15,087	

Table B4. Bachelor's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	97	8,477	61.3%	1,593	72.3%	1,259	53.6%	11,329	61.6%
US CS Private	34	3,104	22.4%	237	10.8%	294	12.5%	3,635	19.8%
Total US CS	131	11,581	83.7%	1,830	83.0%	1,553	66.1%	14,964	81.4%
US CE	7	0	0.0%	298	13.5%	0	0.0%	298	1.6%
US Info	7	295	2.1%	0	0.0%	715	30.5%	1,010	5.5%
Canadian	12	1,961	14.2%	76	3.4%	80	3.4%	2,117	11.5%
Grand Total	157	13,837		2,204		2,348		18,389	

Table B5. New Bachelor's Students by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-major	# Dept	Avg. Major per Dept.	Major	Pre-major	# Dept	Avg. Major per Dept.	Major	Pre-major	# Dept	Avg. Major per Dept.	Total Major	Avg. Major per Dept
US CS Public	10,774	2,943	94	114.6	2,020	670	31	65.2	726	472	26	27.9	13,520	143.8
US CS Private	3,101	586	32	96.9	344	12	10	34.8	379	3	5	75.8	3,828	119.6
US CS Total	13,875	3,529	126	110.1	2,368	682	41	57.8	1,105	475	31	35.6	17,348	137.7
US CE	0	0	0	0.0	320	137	9	53.3	0	0	0	0.0	320	53.3
US Information	294	93	1	0.0	0	0	0	0.0	417	85	6	69.5	711	101.6
Canadian	2,949	325	12	245.8	186	0	2	93.0	112	0	2	0.0	3,247	249.8
Grand Total	17,118	3,947	139	123.2	2,874	819	49	58.7	1,634	560	39	41.9	21,626	142.3

Table B6. Total Bachelor's Enrollment by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-major	# Dept	Avg. Major per Dept.	Major	Pre-major	# Dept	Avg. Major per Dept.	Major	Pre-major	# Dept	Avg. Major per Dept.	Total Major	Avg. Major per Dept
US CS Public	38,564	7,861	94	410.3	7,559	1,633	31	243.8	4,540	479	26	174.6	50,663	539.0
US CS Private	10,302	1,634	32	321.9	1,135	29	10	113.5	1,862	0	5	372.4	13,210	412.8
US CS Total	48,866	9,495	126	387.8	8,694	1,662	41	212.0	5,674	369	28	202.6	63,873	506.9
US CE	0	0	0	0.0	1,820	499	9	202.2	0	0	0	0.0	1,820	303.3
US Information	857	80	0	0.0	0	0	0	0.0	2,553	653	9	283.7	2,699	385.6
Canadian	8,352	300	13	642.5	319	0	2	159.5	0	40	0	0.0	9,261	712.4
Grand Total	58,075	9,875	139	417.8	10,833	2,161	52	208.3	8,227	1,062	37	222.4	77,653	510.9

Figure B1. BS Production (CS & CE)

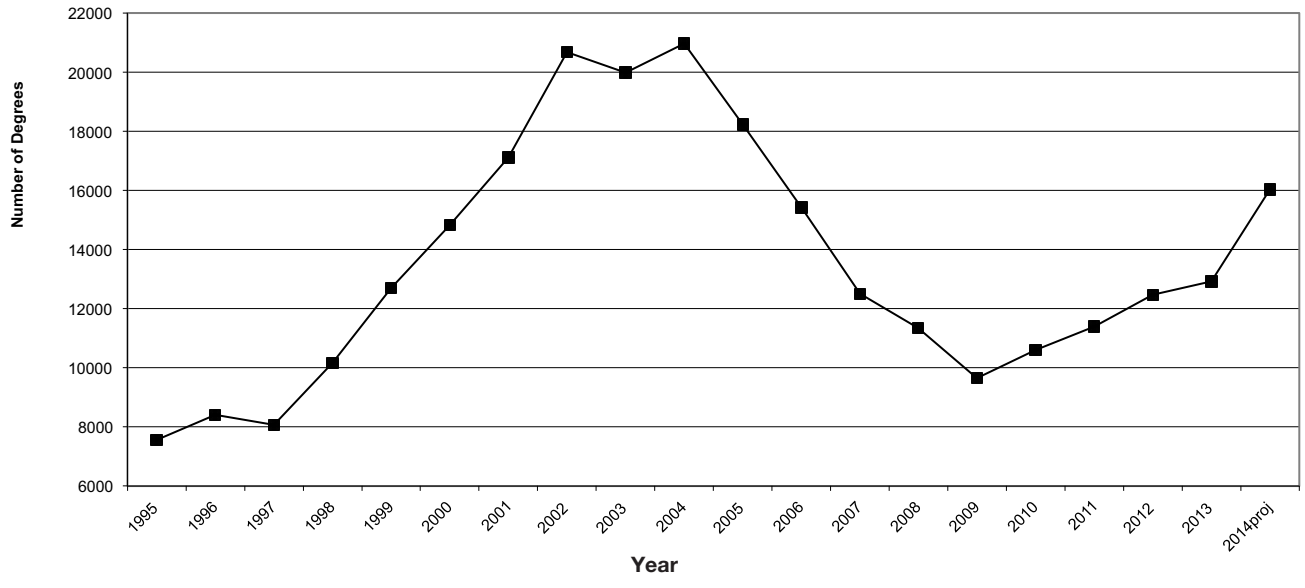


Table B7. Bachelors Degrees Awarded by Gender and Ethnicity, From 125 Departments Providing Breakdown Data

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	561	118	0	8	10	97	19	0	7	10	55	22	0	4	6	872	7.5
Amer Indian or Alaska Native	18	3	0	0	0	5	0	0	0	0	5	1	0	0	0	32	0.3
Asian	1,152	275	0	16	24	354	72	0	25	38	185	68	1	12	19	2,107	18.2
Black or African-American	251	68	0	4	6	52	15	0	4	8	88	48	0	6	14	522	4.5
Native Hawaiian/ Pac Islander	16	6	0	0	1	7	0	0	0	0	2	0	0	0	0	31	0.3
White	4,467	563	0	64	50	807	71	0	57	37	1,000	179	2	67	51	7,089	61.2
Multiracial, not Hispanic	118	23	0	2	2	19	4	0	1	2	13	3	0	1	1	180	1.6
Hispanic, any race	405	75	0	6	7	87	10	0	6	5	141	33	0	9	9	751	6.5
Total Res & Ethnicity Known	6,988	1,131	0			1,428	191	0			1,489	354	3			11,584	
Resident, Ethnicity Unknown	379	79	3			69	12	0			61	13	4			620	
Not Reported (N/R)	90	16	4			17	4	0			10	4	0			145	
Gender Totals	7,457	1,226	7			1,514	207	0			1,560	371	7			12,349	
%	85.9%	14.1%				88.0%	12.0%				80.8%	19.2%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure B2. Newly Declared CS/CE Undergraduate Majors

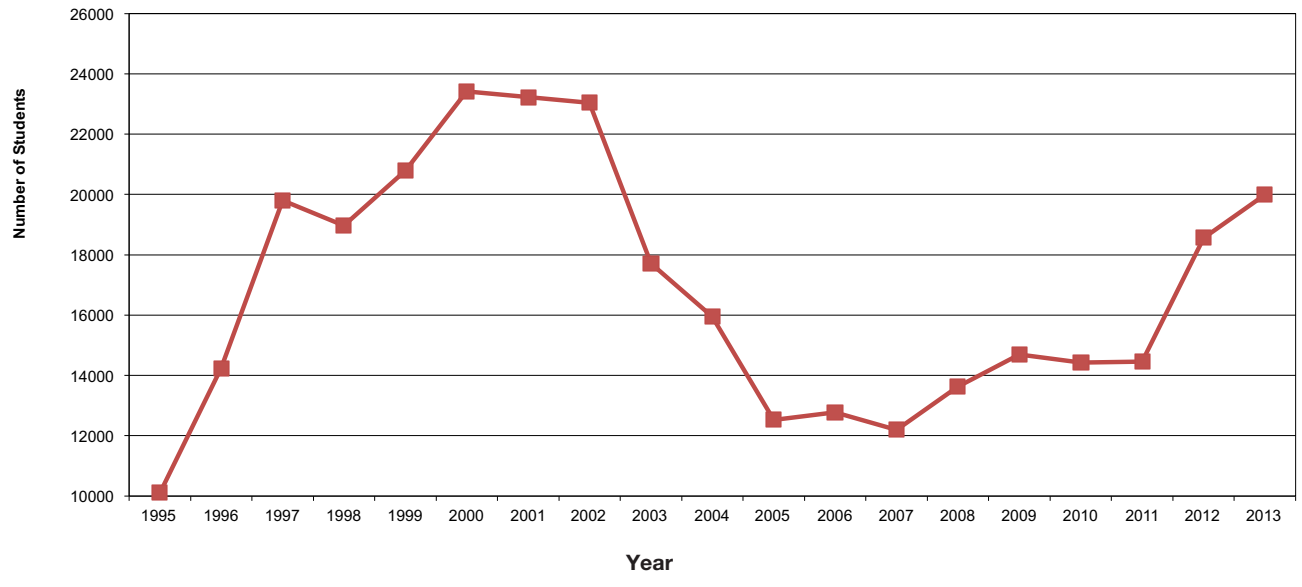


Table B8. Bachelors Enrollment by Gender and Ethnicity, From 121 Departments Providing Breakdown Data

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	3,197	716	0	9	13	580	119	0	8	12	484	146	0	8	11	5,242	9.3
Amer Indian or Alaska Native	141	20	0	0	0	16	2	0	0	0	18	5	0	0	0	202	0.4
Asian	5,255	1,355	0	15	24	1,675	306	0	24	31	568	229	0	10	17	9,388	16.7
Black or African-American	1,569	440	0	4	8	319	60	0	5	6	379	154	0	7	11	2,921	5.2
Native Hawaiian/ Pac Islander	84	13	0	0	0	17	6	0	0	1	17	27	0	0	2	164	0.3
White	21,599	2,522	1	61	45	3,698	375	0	53	39	3,571	603	1	62	44	32,370	57.7
Multiracial, not Hispanic	714	162	0	2	3	145	34	0	2	3	97	54	0	2	4	1,206	2.2
Hispanic, any race	2,743	439	0	8	8	585	71	0	8	7	612	140	0	11	10	4,590	8.2
Total Res & Ethnicity Known	35,302	5,667	1			7,035	973	0			5,746	1,358	1			56,083	
Resident, ethnicity unknown	1,668	278	14			280	48	1			302	63	1			2,655	
Not Reported (N/R)	360	76	25			63	5	0			2	2	0			533	
Gender Totals	37,330	6,021	40			7,378	1,026	1			6,050	1,423	2			59,271	
%	86.1%	13.9%				87.8%	12.2%				81.0%	19.0%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure B3. Bachelor's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2013

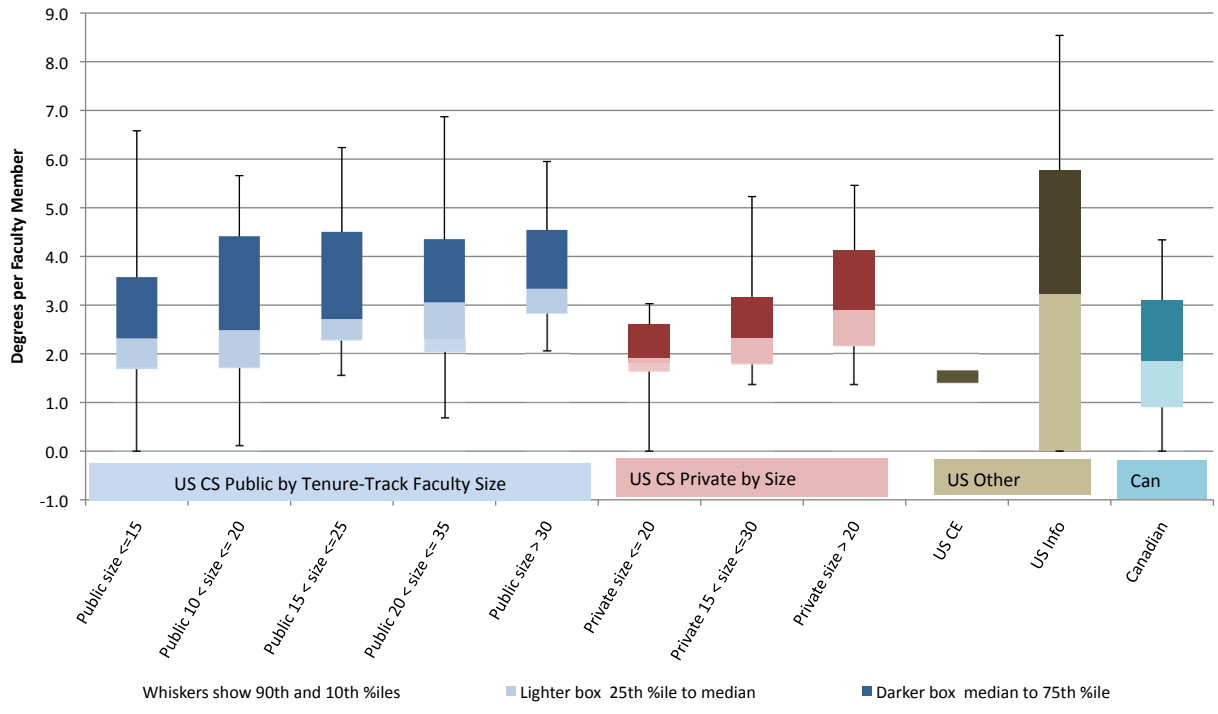
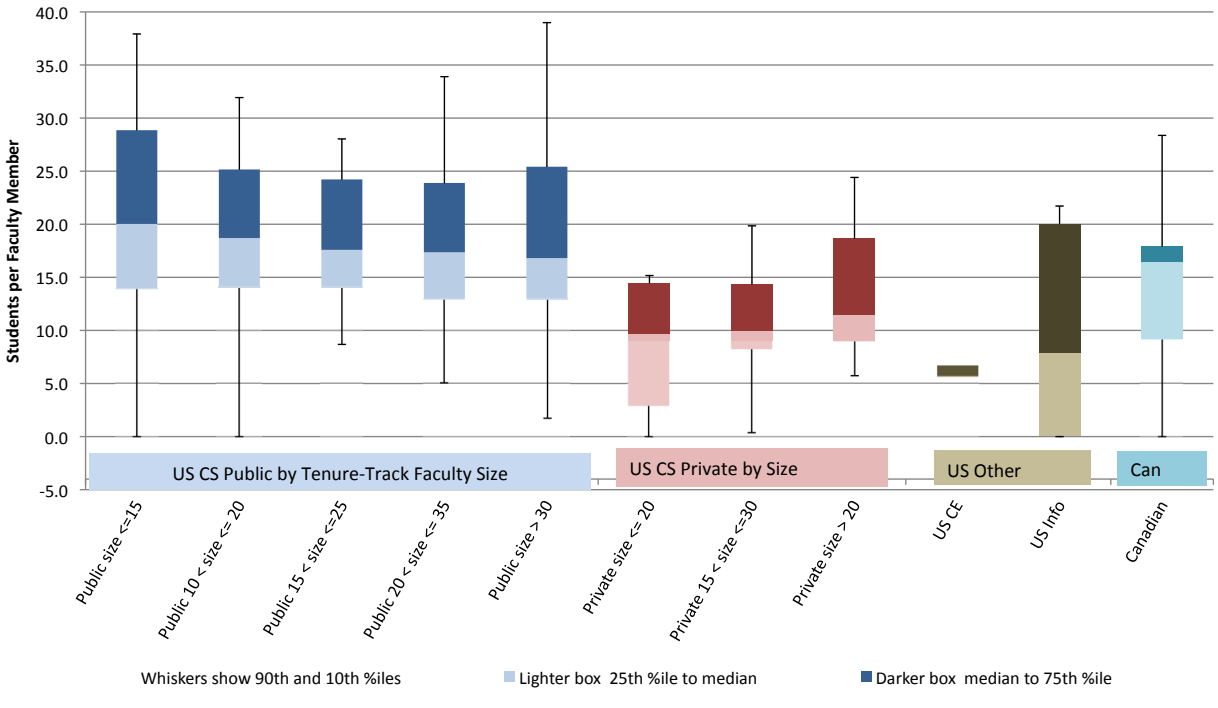


Figure B4. Bachelor's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2013



Faculty Demographics (Tables F1-F9)[7]

Table F1 shows the current and anticipated sizes, in FTE, for tenure-track, teaching and research faculty, and postdocs. The total tenure-track faculty count in U.S. CS departments (3,564) decreased 4.3 percent from last year, but there are fewer departments reporting this year. In fact, there was an increase from last year to this year, from 25.2 to 26.2, in the average tenure-track faculty size per U.S. CS department reporting. In these departments, there also were increases in the number of research faculty per department and the number of postdocs per department, while there was a decrease in the number of teaching faculty per department. The decrease in teaching faculty was confined to U.S. CS public departments; the average in private departments increased. Canadian, CE and I departments have much more volatile data due to the small number of departments reporting in each of those categories.

Canadian universities, on average, have several more tenure-track faculty members per department than do U.S. universities, while on average U.S. I departments and U.S. CE departments are slightly smaller than U.S. CS departments. The observations about U.S. CE and I departments may reflect the fact that we ask departments to report only computing-related faculty, so departments with Library Science or EE programs may report only part of their faculty.

Among U.S. CS departments, those at private universities tend to have more tenure-track, teaching faculty, research faculty and postdocs than do those at public universities on average.

Table F2 summarizes faculty hiring this past year. There were about the same number of tenure-track vacancies per reporting department (1.93) in 2012-13 as compared with 2011-12. U.S. CS departments had a slightly lower average in 2012-13 than in 2011-12, due to decreases per public department. In aggregate, 32.8 percent of the total number of vacant tenure-track positions went unfilled, similar to the 31.7 percent in 2011-12. U.S. CS departments and Canadian departments had lower success rates on average than did U.S. CE and U.S. I departments. The top reason why positions went unfilled again was because offers were

Table F1. Actual and Anticipated Faculty Size by Position and Department Type

	Actual		Projected				Expected 2-Yr Growth	
	2013-2014		2014-2015		2015-2016			
US CS Public	Total	Average	Total	Average	Total	Average	#	%
TenureTrack	2,547	25.2	2,694	26.7	2,797	27.7	250	9.8%
Teaching	221	2.2	256	2.5	276	2.7	55	24.9%
Research	294	2.9	342	3.4	376	3.7	82	27.9%
Postdoc	401	4.0	428	4.2	447	4.4	46	11.5%
Total	3,463	34.3	3,720	36.8	3,896	38.6	433	12.5%
US CS Private								
TenureTrack	1,017	29.1	1,094	31.3	1,149	32.8	132	13.0%
Teaching	200	5.7	222	6.3	237	6.8	37	18.5%
Research	197	5.6	226	6.5	243	6.9	46	23.4%
Postdoc	191	5.5	208	5.9	332	9.5	141	73.8%
Total	1,605	45.9	1,750	50.0	1,961	56.0	356	22.2%
All US CS								
TenureTrack	3,564	26.2	3,788	27.9	3,946	29.0	382	10.7%
Teaching	421	3.1	478	3.5	513	3.8	92	21.9%
Research	491	3.6	568	4.2	619	4.6	128	26.1%
Postdoc	592	4.4	636	4.7	779	5.7	187	31.6%
Total	5,068	37.3	5,470	40.2	5,857	43.1	789	15.6%
US CE								
TenureTrack	212	23.6	220	24.4	228	25.3	16	7.5%
Teaching	33	3.7	36	4.0	38	4.2	5	15.2%
Research	32	3.6	34	3.8	36	4.0	4	12.5%
Postdoc	20	2.2	22	2.4	22	2.4	2	10.0%
Total	297	33.0	312	34.7	324	36.0	27	9.1%

Table F1. Actual and Anticipated Faculty Size by Position and Department Type *(continued)*

	Actual		Projected				Expected 2-Yr Growth	
	2013-2014		2014-2015		2015-2016			
US I								
TenureTrack	216	24.0	234	26.0	245	27.2	29	13.4%
Teaching	21	2.3	21	2.3	19	2.1	-2	-9.5%
Research	18	2.0	19	2.1	24	2.7	6	33.3%
Postdoc	93	10.3	94	10.4	96	10.7	3	3.2%
Total	348	38.7	368	40.9	384	42.7	36	10.3%
Canadian								
TenureTrack	557	39.8	571	40.8	582	41.6	25	4.5%
Teaching	12	0.9	12	0.9	13	0.9	1	8.3%
Research	135	9.6	139	9.9	147	10.5	12	8.9%
Postdoc	61	4.4	65	4.6	64	4.6	3	4.9%
Total	765	54.6	787	56.2	806	57.6	41	5.4%
Grand Total								
TenureTrack	4,549	27.1	4,813	28.6	5,001	29.8	452	9.9%
Teaching	487	2.9	547	3.3	583	3.5	96	19.7%
Research	676	4.0	760	4.5	826	4.9	150	22.2%
Postdoc	766	4.6	817	4.9	961	5.7	195	25.5%
Total	6,478	38.6	6,937	41.3	7,371	43.9	893	13.8%

turned down; this occurred in 54.9 percent of the cases vs. 45.3 percent for 2011-12 (see Table F2a). Not finding a good fit accounted for 37.3 percent of the cases (36.8 percent in 2011-12).

The fraction of women hired into all categories of academic positions (tenure-track, teaching faculty, research faculty and postdoc) fell from 25.3 percent in 2011-12 to 21.0 percent in 2012-13 (Table F3). However, in tenure-track positions, the fraction remained steady (22.5 percent vs. 22.4 percent in 2011-12). There were large percentage decreases in the fraction of women taking research faculty positions and postdoc positions as compared with that reported last year. The fraction of new female tenure-track and overall faculty hires continues to exceed the fraction of new female Ph.D.s produced this past year (18 percent).

Among new tenure-track faculty, there was a somewhat smaller fraction of white, Asian and Black hires than reported last year, while there was a higher fraction of Non-resident Alien new hires. Whites again very much dominated the newly hired teaching faculty, with Asians and Non-resident Aliens accounting for most of the remainder. Among research faculty, whites again dominate, with Non-resident Aliens second. Among postdocs, Non-resident Aliens comprise the largest category, with whites second (Table F4).

There were more faculty losses reported this year as compared with last year (Table F5). This year's report showed a smaller fraction of losses due to retirements (31.9 percent vs. 40.3 percent reported last year) and somewhat larger fraction of losses due to movement to another (academic or non-academic) position.

This year, there was almost no change in the fraction of women at all three academic professorial ranks (Table F6). For the second year in a row, the overall fraction of women among teaching faculty increased, while the fraction of women among both research faculty and postdocs declined. Ethnicity patterns do not change very much from year to year. Whites, Asians and Non-resident Aliens account for over 90 percent of each category of faculty members (Table F7).

Among departments reporting faculty data, 93% provided the newly-requested gender by ethnicity breakdown. (Table F8 and F9). Among full professors, 78 percent of the women are White while 69 percent of the men are White, and 17 percent of the women are Asian while 27 percent of the men are Asian. No other noticeable differences are present at other tenure-track faculty ranks. Among postdocs, 39 percent of the women are White while 33 percent of the men are White, and 45 percent of the men are Non-resident Aliens while 36 percent of the women are Non-resident Aliens.

For next year, reporting departments forecast a 5.8 percent growth in tenure-track faculty and a 6.6 percent growth in postdocs. Teaching and research faculty growth projections are even higher, at 12 percent.

Table F2. Vacant Positions 2012-2013 by Position and Department Type		
	Tried to fill	Filled
US CS Public		
TenureTrack	198	125
Teaching	87	80
Research	55	47
Postdoc	130	126
Total	470	378
US CS Private		
TenureTrack	77	51
Teaching	50	45
Research	23	23
Postdoc	57	56
Total	207	175
All US CS		
TenureTrack	275	176
Teaching	137	125
Research	78	70
Postdoc	187	182
Total	677	553
US CE		
TenureTrack	12	12
Teaching	4	4
Research	7	7
Postdoc	20	20
Total	43	43
US I		
TenureTrack	31	26
Teaching	5	4
Research	10	10
Postdoc	9	9
Total	55	49
Canadian		
TenureTrack	20	13
Teaching	8	7
Research	21	21
Postdoc	18	18
Total	67	59
Grand Total		
TenureTrack	338	227
Teaching	154	140
Research	116	108
Postdoc	234	229
Total	842	704

Table F2a. Reasons Positions Left Unfilled		
Reason	**# Reported**	**% of Reasons**
Didn't find a good fit	38	40.0%
Offers turned down	56	58.9%
Technically vacant, not filled for admin reasons	4	4.2%
Hiring in progress	3	3.2%
Other	1	1.1%
Total Reasons Provided	102	

Table F3. Gender of Newly Hired Faculty										
	Tenure-Track		Teaching		Research		Postdoc		Total	
Male	169	77.5%	66	66.7%	47	92.2%	167	83.5%	449	79.0%
Female	49	22.5%	33	33.3%	4	7.8%	33	16.5%	119	21.0%
Unknown	0		0		0		4		4	
Total	218		99		51		204		572	

Table F4. Ethnicity of Newly Hired Faculty										
	Tenure-Track		Teaching		Research		Postdoc		Total	
Nonresident Alien	50	23.9%	8	8.2%	11	22.0%	74	43.3%	143	27.1%
American Indian / Alaska Native	0	0.0%	1	1.0%	0	0.0%	0	0.0%	1	0.2%
Asian	42	20.1%	9	9.3%	6	12.0%	25	14.6%	82	15.6%
Black or African-American	4	1.9%	3	3.1%	0	0.0%	3	1.8%	10	1.9%
Native Hawaiian/ Pacific Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
White	99	47.4%	69	71.1%	27	54.0%	52	30.4%	247	46.9%
Multiracial, not Hispanic	5	2.4%	1	1.0%	0	0.0%	0	0.0%	6	1.1%
Hispanic, any race	4	1.9%	4	4.1%	1	2.0%	0	0.0%	9	1.7%
Resident, race/ethnic unknown	5	2.4%	2	2.1%	5	10.0%	17	9.9%	29	5.5%
Total known residency	209	100.0%	97	100.0%	50	100.0%	171	100.0%	527	100.0%
Residency Unknown	9		2		1		33		45	
Total	218		99		51		204		572	

Table F5. Faculty Losses	
Died	9
Retired	74
Took Academic Position Elsewhere	74
Took Nonacademic Position	32
Remained, but Changed to Part Time	11
Other	22
Unknown	10
Total	232

Table F6. Gender of Current Faculty														
	Full		Associate		Assistant		Teaching		Research		Postdoc		Total	
Male	1,830	85.8%	1,223	79.5%	566	73.4%	565	70.3%	391	82.8%	574	81.3%	5,149	80.2%
Female	285	13.4%	302	19.6%	202	26.2%	237	29.5%	81	17.2%	129	18.3%	1,236	19.2%
Unknown	17		14		3		2		0		3		39	
Total	2,132		1,539		771		804		472		706		6,424	

Table F7. Ethnicity of Current Faculty

	Full		Associate		Assistant		Teaching		Research		Postdoc		Total	
Nonresident Alien	12	0.6%	26	1.9%	113	15.7%	18	2.4%	60	13.5%	242	43.1%	471	8.3%
American Indian / Alaska Native	2	0.1%	4	0.3%	1	0.1%	5	0.7%	0	0.0%	0	0.0%	12	0.2%
Asian	471	25.0%	422	31.1%	180	25.1%	69	9.3%	69	15.5%	87	15.5%	1,298	22.7%
Black or African-American	16	0.8%	25	1.8%	25	3.5%	25	3.4%	5	1.1%	24	4.3%	120	2.1%
Native Hawaiian/ Pacific Islander	2	0.1%	4	0.3%	0	0.0%	0	0.0%	0	0.0%	2	0.4%	8	0.1%
White	1,318	69.9%	806	59.4%	366	51.0%	595	80.5%	288	64.6%	179	31.9%	3,552	62.3%
Multiracial, not Hispanic	18	1.0%	15	1.1%	5	0.7%	3	0.4%	3	0.7%	1	0.2%	45	0.8%
Hispanic, any race	32	1.7%	40	2.9%	21	2.9%	18	2.4%	10	2.2%	9	1.6%	130	2.3%
Resident, race/ ethnic unknown	14	0.7%	14	1.0%	7	1.0%	6	0.8%	11	2.5%	18	3.2%	70	1.2%
Total known residency	1,885	100%	1,356	100%	718	100%	739	100%	446	100%	562	100%	5,706	100%
Residency Unknown	247		183		53		65		26		144		718	
Total	2,132		1,539		771		804		472		706		6,424	

Table F8. Current Tenured and Tenure-Track Faculty by Gender and Ethnicity, From 143 Departments Providing Breakdown Data

	Full Professor					Associate Professor					Assistant Professor					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	9	3	0	1	1	21	5	0	2	2	87	26	0	17	14	151	3.9
Amer Indian or Alaska Native	2	0	0	0	0	1	2	0	0	1	1	0	0	0	0	6	0.2
Asian	429	42	0	27	17	332	90	0	31	34	125	54	0	24	29	1,072	27.5
Black or African-American	13	3	0	1	1	17	8	0	2	3	15	10	0	3	5	66	1.7
Native Hawaiian/ Pac Islander	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	6	0.2
White	1,114	197	0	69	78	647	149	0	61	56	271	92	0	53	49	2,470	63.3
Multiracial, not Hispanic	14	4	0	1	2	15	0	0	1	0	3	0	0	1	0	36	0.9
Hispanic, any race	27	5	0	2	2	29	11	0	3	4	13	7	0	3	4	92	2.4
Total Res & Ethnicity Known	1,610	254	0			1,066	265	0			515	189	0			3,899	
Resident, ethnicity unknown	13	1	0			12	2	0			5	2	0			35	
Not Reported (N/R)	16	5	0			7	5	0			10	1	0			44	
Gender Totals	1,639	260	0			1,085	272	0			530	192	0			3,978	
%	86.3%	13.7%				80.0%	20.0%				73.4%	26.6%					

* %M and %F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Table F9. Current Non-Tenure-Track Faculty and Postdoctorates by Gender and Ethnicity, From 143 Departments Providing Breakdown Data

	Non-Tenure-Track Teaching					Non-Tenure-Track Research					Postdoctorates					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	13	5	0	3	2	52	8	0	14	11	189	37	1	45	36	305	18.1
Amer Indian or Alaska Native	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0.3
Asian	42	26	0	8	12	54	15	0	15	21	69	18	0	16	17	224	13.3
Black or African-American	13	12	0	3	6	3	1	0	1	1	17	7	0	4	7	53	3.1
Native Hawaiian/ Pac Islander	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.1
White	423	163	0	83	75	241	46	0	67	64	139	40	0	33	38	1,052	62.5
Multiracial, not Hispanic	3	0	0	1	0	2	1	0	1	1	1	0	0	0	0	7	0.4
Hispanic, any race	9	9	0	2	4	8	1	0	2	1	7	2	0	2	2	36	2.1
Total Res & Ethnicity Known	507	216	0			360	72	0			424	104	1			1,684	
Resident, ethnicity unknown	4	2	0			9	2	0			12	3	0			32	
Not Reported (N/R)	10	2	0			1	0	0			35	4	0			52	
Gender Totals	521	220	0			370	74	0			471	111	1			1,768	
%	70.3%	29.7%				83.3%	16.7%	0			80.9%	19.1%					

* %M and %F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Research Expenditures (Table R1; Figures R1-R2)

Table R1 shows the department's total expenditure (including indirect costs or "overhead" as stated on project budgets) from external sources of support. Figures R1 and R2 show the per capita expenditure, where capitation is computed two ways. The first (Figure R1) is relative to the number of tenure-track faculty members. The second (Figure R2) is relative to researchers and postdocs as well as tenure-track faculty. Canadian levels are shown in Canadian dollars.

Overall median research expenditures for 2012-13 at U.S. CS public departments rose 1.9 percent in comparison with 2011-12. At U.S. CS departments in private institutions, median expenditures declined by 6 percent. However, research expenditures at U.S. departments in private institutions tend to exceed those departments in public institutions. Median expenditures also rose at U.S. CE departments (3.4 percent), U.S. I departments (9.2 percent) and Canadian departments (15.0 percent) in comparison with 2011-12.

The U.S. CS data for public institutions indicate that the larger the department, the more external funding is received by the department (both in total and per capita). Research expenditures at private institutions were less affected by the size of the department, though per capita they also tended to rise with department size. Both of these observations are consistent with what we reported in last year's survey.

Table R1. Total Expenditure from External Sources for Computing Research

Department Type	# Depts	Percentile of Department Averages				
		10th	25th	50th	75th	90th
US CS Public	87	$593,406	$1,840,219	$3,743,805	$7,796,783	$15,252,450
US CS Private	31	$906,575	$2,445,560	$4,872,000	$11,000,000	$23,695,307
US CE	5			$3,099,835		
US Information	9			$4,416,679		
Canadian	11	$194,548	$1,110,236	$3,595,968	$6,000,000	$6,374,580

Figure R1. Research Expenditures Normalized by Tenure-Track Size

CRA Taulbee Survey 2013

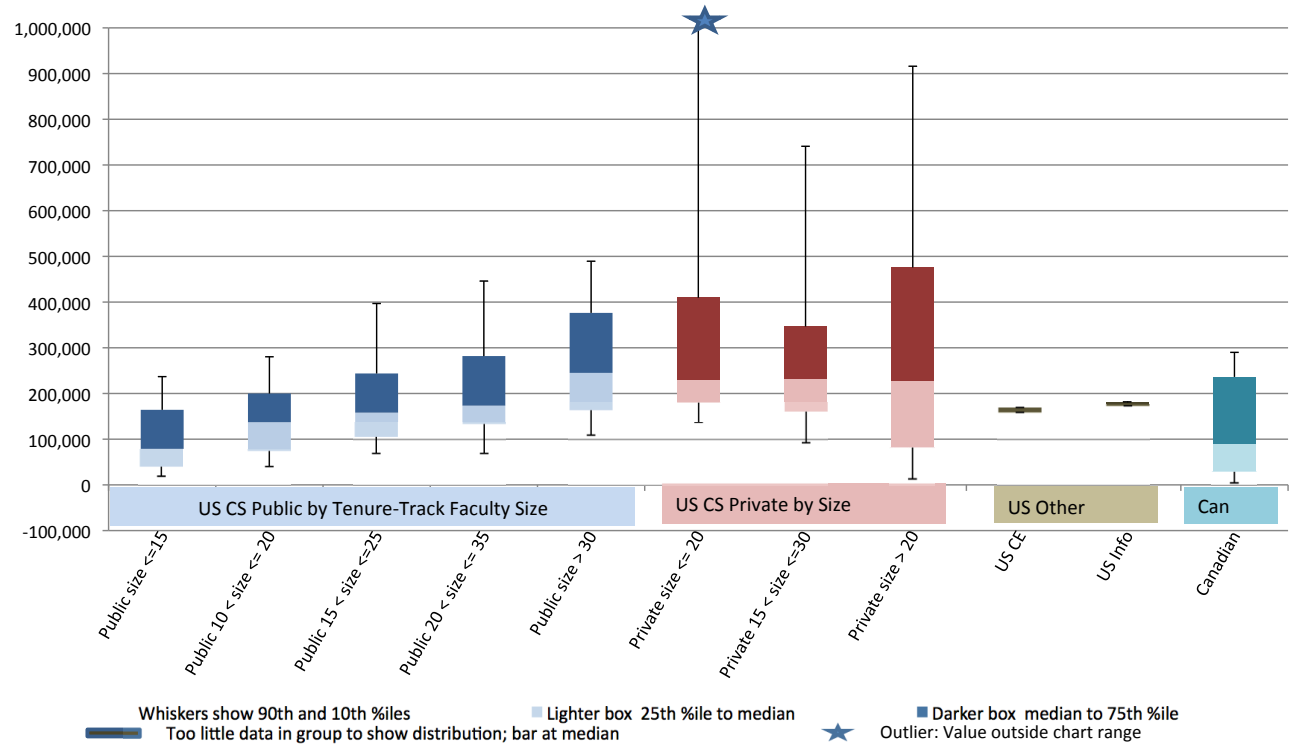
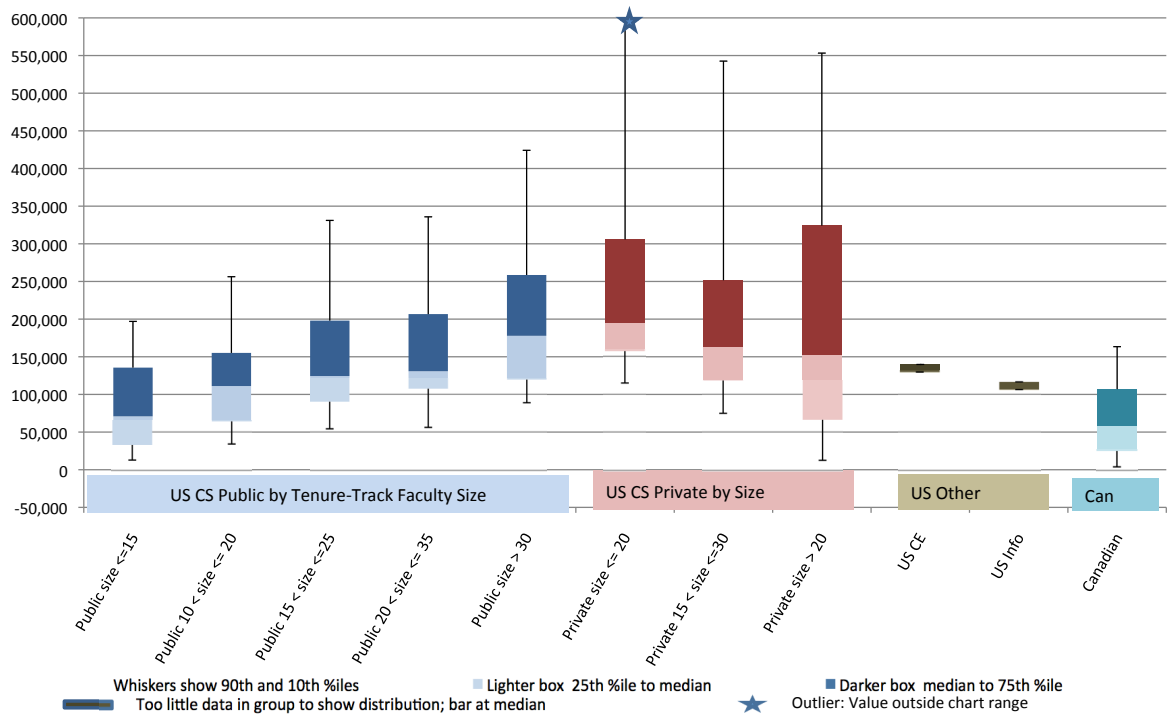


Figure R2. Research Expenditures Normalized by Tenure-Track + Research Faculty + Postdoctorates

CRA Taulbee Survey 2013



Graduate Student Support (Tables G1-G2; Figures G1-G3)

Table G1 shows the number of graduate students supported as full-time students as of fall 2013, further categorized as teaching assistants (TAs), research assistants (RAs), and full-support fellows. The table also shows the split between those on institutional vs. external funds. The total number of TAs on institutional funds in U.S. CS departments increased 8.6 percent this year although the number of departments reporting this year decreased. Private universities led the way, with over a 25 percent increase. In last year's report, we noted that just the opposite was true; there was an overall decrease in TAs at U.S. CS departments, with private universities having over a 30 percent decrease. It is possible that there were some errors in departmental reporting last year. Compared with two years ago, public universities show about a 10 percent increase in TAs on university funds, with 5 percent more departments reporting, while private universities show an 18 percent decrease with the same number of departments reporting.

There was an overall decrease of 1.7 percent in the number of RAs that were supported on institutional funds at U.S. CS departments, but with fewer departments reporting that is not surprising. Departments at private universities showed an 8 percent decline while departments at public universities showed a small increase. The number of RAs on external funding declined in U.S. CS departments at public universities, but increased sizably (over 17 percent) in departments at private universities. Here again, we see private institutions experiencing just the reverse of what was experienced in last year's report. We do note that, last year, departments at private universities had lower research expenditures (see the previous section), so it is possible that this impacted the number of RAs they could support last year. Perhaps the sizeable increase in RA support this year is evidence of increased external funding. Compared with two years ago, RA support on external funds is 6 percent lower this year.

The number of full-support fellows rose at U.S. CS departments at public institutions with respect to both institutional fund and external fund support, and declined in both categories of support at U.S. private universities. This is the reverse of what happened last year.

U.S. CE departments showed an increase in both institutionally and externally supported RAs. U.S. I departments showed an increased number of externally supported RAs and fellows and a decreased number of institutionally supported RAs, as well as an increase in institutionally supported TAs and a decrease in externally supported TAs. Canadian departments showed a decline in TAs and in institutionally supported RAs, and an increase in externally supported RAs and in both institutionally and externally supported fellows.

Table G2 shows the distribution of stipends for TAs, RAs, and full-support fellows. U.S. CS data are further broken down in this table by public and private institution. Figures G1-G3 further break down the U.S. CS data by size of department and by geographic location of the university.

The median salaries at U.S. private departments were flat across the TA and RA categories for the second straight year. Median salaries of full support fellows at U.S. private departments rose nearly 7 percent. At U.S. public departments, medians of RA salaries were flat, those of TA salaries increased by 5 percent, and those for fellows increased 9 percent.

Larger departments at U.S. public universities tend to offer higher stipends to both TAs and RAs than do smaller departments, and private universities tend to offer higher stipends to all categories of grad students than do public universities. As was the case last year, departments located in larger population centers also tend to pay higher stipends to TAs and RAs, while the data for full-support fellows exhibits no clear trend relative to locale.

Figure G1. Teaching Assistantship Stipends

CRA Taulbee Survey 2013

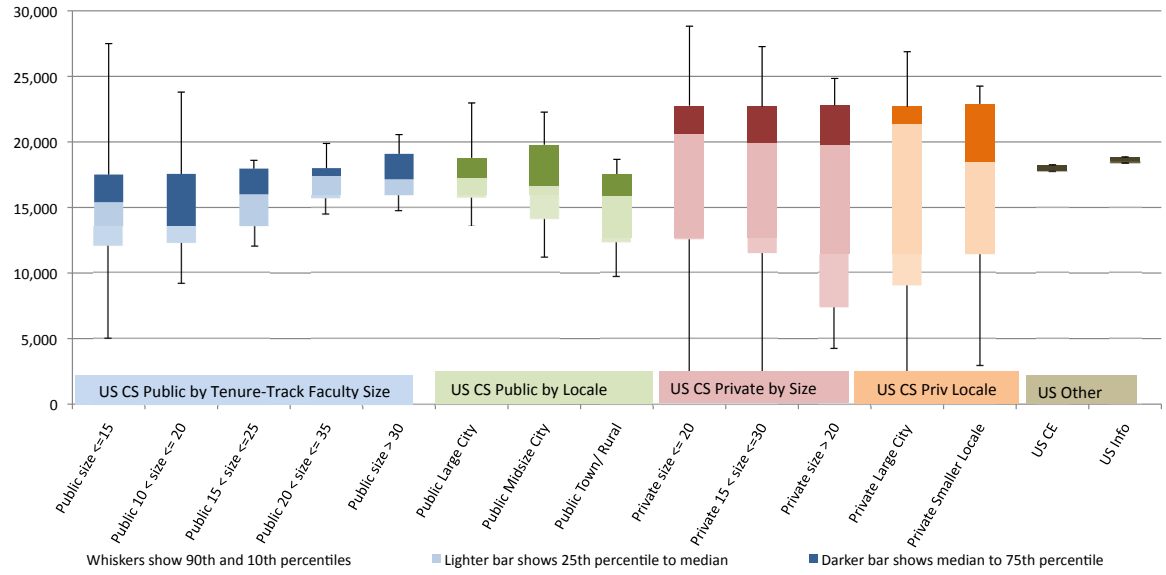


Figure G2. Research Assistantship Stipends

CRA Taulbee Survey 2013

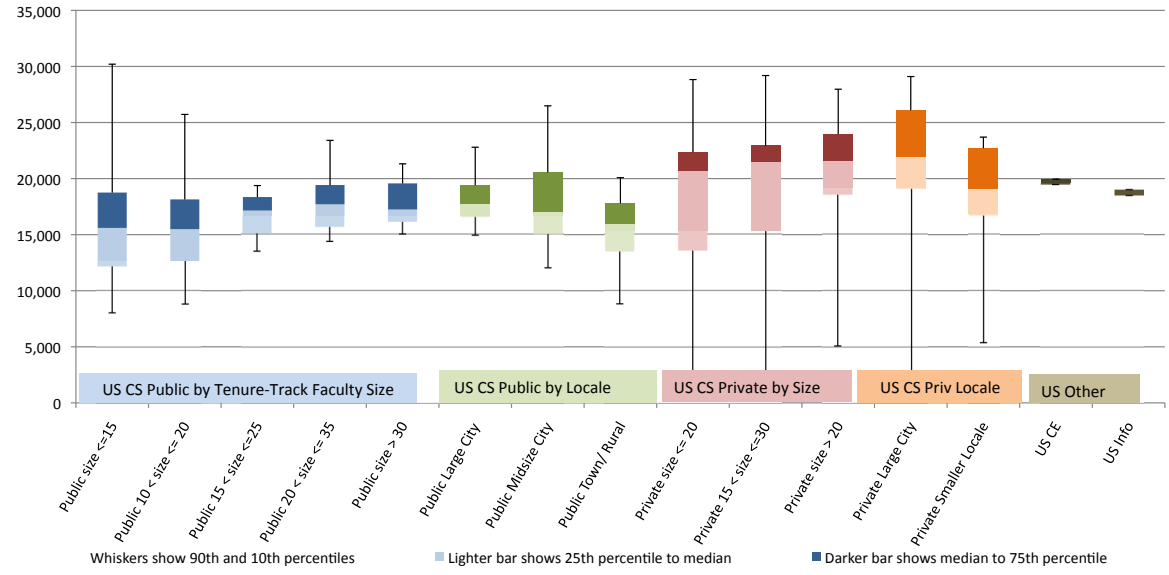


Figure G3. Full Support Fellows Stipends

CRA Taulbee Survey 2013

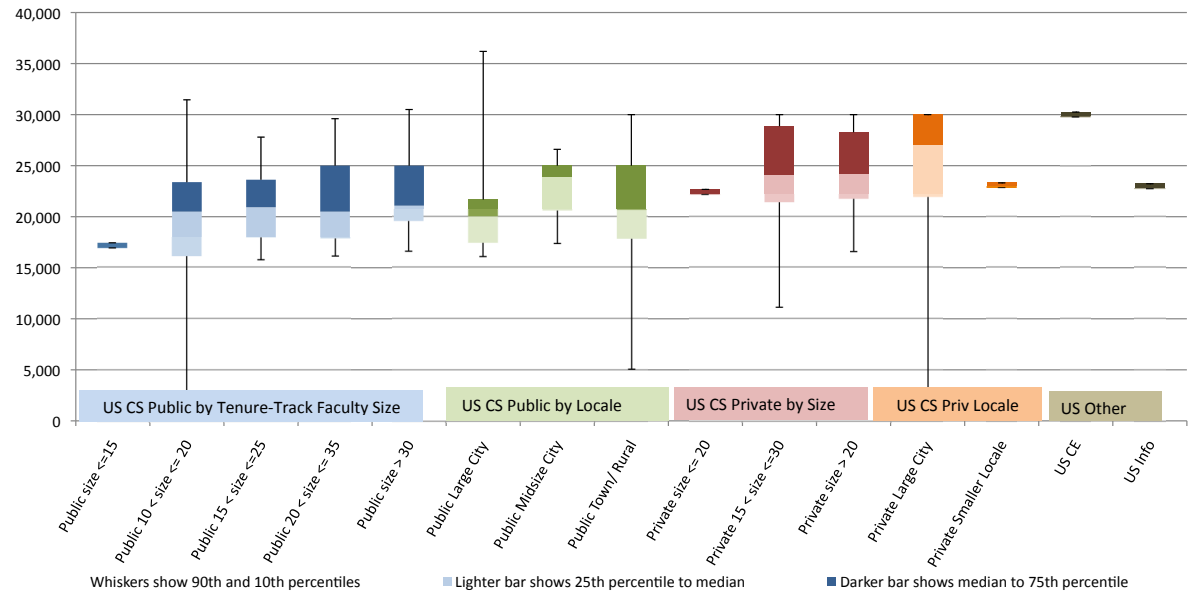


Table G1. Graduate Students Supported as Full-Time Students by Department Type

		On Institutional Funds						On External Funds						Total
Department Type	# Dept	Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	105	2,470	34.3%	755	10.5%	275	3.8%	10	0.1%	3,398	47.2%	298	4.1%	7,206
US CS Private	36	597	20.2%	568	19.2%	186	6.3%	16	0.5%	1,400	47.3%	192	6.5%	2,959
US CS Total	141	3,067	30.2%	1,323	13.0%	461	4.5%	26	0.3%	4,798	47.2%	490	4.8%	10,165
US CE	9	58	16.6%	131	37.5%	22	6.3%	0	0.0%	134	38.4%	4	1.1%	349
US I	10	162	37.7%	41	9.5%	22	5.1%	1	0.2%	194	45.1%	10	2.3%	430
Canadian	15	294	31.3%	168	17.9%	93	9.9%	0	0.0%	351	37.3%	34	3.6%	940
Grand Total	175	3,581	30.1%	1,663	14.0%	598	5.0%	27	0.2%	5,477	46.1%	538	4.5%	11,884

Table G2. Fall 2013 Academic-Year Graduate Stipends by Department Type and Support Type

Teaching Assistantships						
		Percentiles of Department Averages				
Department Type	# Depts	10th	25th	50th	75th	90th
US CS Public	97	$12,000	$13,801	$16,500	$17,948	$20,710
US CS Private	28	$2,263	$11,520	$20,210	$22,784	$25,560
US CE	7			$18,000		
US Information	7			$18,600		
Canadian	9			$13,360		
Research Assistantships						
		Percentiles of Department Averages				
Department Type	# Depts	10th	25th	50th	75th	90th
US CS Public	95	$12,106	$14,982	$17,000	$19,000	$22,568
US CS Private	31	$2,836	$18,315	$21,375	$23,060	$27,959
US CE	8			$19,700		
US Information	7			$18,600		
Canadian	8			$19,500		
Full-Support Fellows						
		Percentiles of Department Averages				
Department Type	# Depts	10th	25th	50th	75th	90th
US CS Public	56	$15,476	$18,000	$20,770	$24,725	$30,000
US CS Private	24	$10,920	$21,145	$23,988	$28,464	$30,000
US CE	3			$24,650		
US Information	6			$22,976		
Canadian	3			$16,369		

Faculty Salaries (Tables S1-S21; Figures S1-S9)

Each department was asked to report individual (but anonymous) faculty salaries if possible; otherwise, the department was requested to provide the mean salary for each rank (full, associate, and assistant professors and non-tenure-track teaching faculty, research faculty, and post-doctorates) and the number of persons at each rank. The salaries are those in effect on January 1, 2014. For U.S. departments, nine-month salaries are reported in U.S. dollars. For Canadian departments, twelve-month salaries are reported in Canadian dollars. Respondents were asked to include salary supplements such as salary monies from endowed positions.

U.S. CS data are reported in Tables S1-S16 and in the box and whiskers diagrams. Data for CE, I, Canadian and new Ph.D.s are reported in Tables S17-S20. The tables and diagrams contain distributional data (first decile, quartiles, and ninth decile) computed from the department averages only. Thus, for example, a table row labeled "50" or the median line in a diagram is the median of the averages for the departments that reported within the stratum (the number of such departments reporting is shown in the "depts" row). It therefore is not a true median of all of the salaries.

We also report salary data for senior faculty based on time in rank, for meaningful comparison of individual or departmental faculty salaries with national averages. We report associate professor salaries for time in rank of 7 years or less, and of more than 7 years. For full professors, we report time in rank of 7 years or less, 8 to 15 years, and more than 15 years.

Those departments reporting salary data were provided a summary report in December 2013. Those departments that provided individual salaries were additionally provided more comprehensive distributional information based on these individual salaries. This year, 86 percent of those reporting salary data provided salaries at the individual level. The remainder of this section is an excerpt from the basic report sent in December to all departments that provided salary data.

The data this year again show that salaries at private universities tend to be higher than those at public universities in all faculty strata (Tables S2 and S3). At public universities, salaries tend to be higher for larger departments (Tables S4-S8). At private universities, early stage associate and full professor salaries are somewhat higher in smaller locales, while early stage associate professor salaries are somewhat lower in larger departments. Public university salaries appear to be generally lower in smaller departments and in smaller locales.

To provide a more meaningful comparison of this year's salaries with those from last year's Taulbee report, we use only those departments that reported both years. Because some departments that reported both years provided only aggregate salaries for their full and associate professors during one year and in the other year reported them by years in rank, we only include the salaries for all full professors and for all associate professors in the year-to-year comparison. Table S21 shows the change in median of the average salaries in departments that reported both years (the number of departments being compared is indicated in parenthesis in the first row of each column).

Table S1. Nine-month Salaries, 138 Responses of 187 US CS Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	109	115	118	12	101	127	10	131	115	69	80
Indiv	549	516	538	89	326	830	52	635	544	350	483
10	$118,476	$118,090	$110,110	$139,090	$92,244	$94,364	$96,357	$84,048	$53,811	$59,265	$41,622
25	$133,728	$127,925	$123,301	$151,849	$97,797	$100,363	$102,366	$88,549	$59,496	$68,809	$45,865
50	$153,572	$143,086	$134,246	$159,221	$103,497	$107,447	$108,800	$94,191	$70,993	$87,395	$52,980
75	$169,388	$164,518	$148,648	$182,173	$114,606	$115,333	$141,825	$100,614	$81,500	$99,035	$59,515
90	$195,935	$184,056	$164,934	$201,620	$122,738	$124,095	$161,593	$106,015	$97,500	$121,546	$68,282

Table S2. Nine-month Salaries, 105 Responses of 135 US CS Public (All Public), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	84	89	90	10	81	98	8	99	89	47	58
Indiv	392	379	403	66	239	642	45	455	385	221	318
10	$118,702	$117,443	$106,737	$151,059	$92,244	$92,772	*	$83,155	$51,523	$59,171	$41,554
25	$132,620	$125,696	$119,269	$151,867	$97,516	$99,591	*	$86,820	$58,812	$68,100	$45,767
50	$149,499	$141,734	$131,650	$159,221	$101,714	$105,664	$108,800	$92,278	$67,407	$86,420	$51,874
75	$164,539	$159,019	$145,390	$177,062	$112,031	$111,932	*	$97,526	$76,610	$97,257	$58,899
90	$176,225	$172,917	$156,634	$202,540	$120,009	$118,927	*	$101,740	$94,740	$110,424	$67,009

Table S3. Nine-month Salaries, 33 Responses of 52 US CS Private (All Private), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	25	26	28	2	20	29	2	32	26	22	22
Indiv	157	137	135	23	87	188	7	180	159	129	165
10	$117,469	$129,675	$118,988		$79,191	$102,913		$91,827	$54,275	$57,786	$41,227
25	$139,999	$142,631	$127,109		$102,199	$108,500		$96,007	$71,346	$68,917	$46,308
50	$168,300	$161,962	$150,167		$113,221	$116,911		$103,297	$76,462	$92,709	$54,167
75	$202,113	$183,941	$164,982		$124,765	$127,571		$107,078	$90,760	$115,202	$61,543
90	$214,540	$194,919	$211,082		$139,421	$138,667		$110,393	$101,797	$138,469	$70,088

When interpreting these changes, it is important to remember the effect that promotions have on the departmental data from one year to the next, since individual faculty members move from one rank to another. Thus, a department with a small number of faculty members in a particular rank can have its average salary in that rank change appreciably (in either direction) by a single promotion to or from that rank. Departures via resignation or retirement also impact these figures, particularly in the non-tenure-track categories. Because of the small number of Canadian and Computer Engineering departments reporting, the values in those columns are considerably more volatile.

For new Ph.D.s in tenure-track positions at U.S. computer science, computer engineering, and I-school departments (Table S20) the median of the averages increased by 2.4 percent vs. last year. Again this year, there are too few reported Canadian salaries for new Ph.D.s to make meaningful comparisons.

Table S4. Nine-month Salaries, 32 Responses of US CS Public With <=15 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	19	22	24	3	21	29	3	27	24	6	8
Indiv	46	41	62	9	40	105	11	71	64	12	12
10	$103,644	$107,762	$98,434	*	$91,308	$87,465	*	$74,323	$47,810	*	*
25	$113,254	$117,249	$104,787	*	$95,517	$92,494	*	$81,603	$55,344	*	*
50	$131,807	$124,001	$124,369	$151,840	$98,118	$99,806	$102,540	$86,005	$61,085	$68,211	$52,016
75	$140,364	$134,125	$137,082	*	$111,612	$107,147	*	$90,913	$74,064	*	*
90	$148,197	$162,280	$154,443	*	$123,629	$111,590	*	$99,815	$86,904	*	*

Table S5. Nine-month Salaries, 40 Responses of US CS Public With 10 < Tenure-Track Faculty <=20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	31	30	33	3	33	38	2	38	31	9	13
Indiv	86	64	77	8	80	163	6	107	95	16	23
10	$112,152	$114,369	$103,013	*	$91,138	$88,751		$80,445	$49,815	*	$21,434
25	$129,080	$119,527	$110,047	*	$95,262	$94,341		$84,574	$54,136	*	$34,448
50	$139,628	$128,180	$123,714	$169,950	$98,300	$101,298		$88,900	$60,978	$66,755	$49,170
75	$152,454	$142,935	$136,425	*	$105,799	$107,312		$93,235	$72,465	*	$57,000
90	$174,030	$169,454	$156,686	*	$117,400	$112,996		$100,181	$83,055	*	$66,730

Table S6. Nine-month Salaries, 35 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	30	31	31	3	30	33	2	35	31	14	18
Indiv	102	105	92	16	78	176	22	137	123	57	45
10	$123,929	$117,458	$110,348	*	$88,682	$93,274		$83,240	$51,148	$48,378	$22,711
25	$132,054	$124,682	$117,890	*	$96,168	$100,160		$87,130	$56,215	$65,573	$42,272
50	$151,152	$137,621	$130,502	$165,300	$100,579	$105,593		$91,500	$64,800	$71,990	$49,585
75	$166,984	$146,238	$140,788	*	$107,788	$110,500		$97,034	$71,667	$97,394	$59,438
90	$189,458	$163,880	$155,453	*	$120,039	$120,566		$100,740	$83,390	$107,398	$67,334

Table S7. Nine-month Salaries, 33 Responses of US CS Public With 20 < Tenure-Track Faculty <=35, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	30	31	30	4	27	31	2	33	29	20	22
Indiv	138	129	116	21	86	192	22	163	132	78	123
10	$123,929	$120,773	$112,820		$92,139	$95,946		$83,482	$56,142	$60,288	$41,861
25	$135,211	$132,526	$125,431		$97,973	$102,421		$88,661	$61,578	$68,394	$45,506
50	$158,312	$146,238	$136,949	$159,221	$104,322	$106,499		$92,947	$67,801	$87,631	$51,146
75	$169,129	$165,227	$146,485		$115,242	$113,250		$97,296	$85,744	$95,201	$58,899
90	$173,079	$186,873	$164,026		$120,232	$118,385		$101,950	$108,426	$100,720	$65,925

Table S8. Nine-month Salaries, 31 Responses of US CS Public With Tenure-Track Faculty >30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	28	29	28		24	29	3	30	28	25	26
Indiv	209	202	223		100	312	12	214	170	144	203
10	$137,401	$129,007	$124,790		$97,003	$101,414		$87,804	$56,595	$61,316	$44,155
25	$146,859	$143,079	$129,765		$101,339	$103,509		$92,163	$65,319	$74,279	$49,058
50	$158,585	$154,740	$140,713		$108,143	$111,620	$140,000	$96,259	$74,766	$87,867	$55,412
75	$168,373	$165,123	$147,339		$115,718	$116,061		$99,830	$84,860	$100,472	$59,724
90	$193,725	$179,789	$156,872		$122,066	$121,916		$105,679	$99,277	$121,919	$71,423

Table S9. Nine-month Salaries, 13 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	6	6	10	2	7	10	2	12	10	9	10
Indiv	21	15	32	23	15	33	7	41	31	43	36
10	*	*	$115,889		*	$100,341		$90,410	$55,359	*	$33,150
25	*	*	$121,427		*	$109,954		$96,518	$66,905	*	$52,125
50	$143,643	$171,824	$154,385		$115,103	$117,767		$101,887	$74,903	$91,500	$57,455
75	*	*	$185,362		*	$125,921		$109,342	$78,182	*	$62,188
90	*	*	$229,094		*	$137,338		$117,653	$97,536	*	$72,494

Table S10. Nine-month Salaries, 18 Responses of US CS Private With 15 < Tenure-Track Faculty <=30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	14	16	15	1	11	15	1	18	14	12	14
Indiv	60	62	66	17	28	63	1	76	53	43	88
10	$117,433	$140,299	$121,968		$79,248	$103,985		$93,690	$47,754	$59,910	$43,272
25	$158,772	$147,648	$140,934		$102,366	$108,580		$97,011	$70,733	$68,855	$52,187
50	$182,872	$173,841	$155,575		$113,130	$116,911		$103,404	$75,612	$88,806	$59,459
75	$208,435	$185,228	$176,921		$126,850	$126,179		$109,606	$86,462	$102,230	$65,861
90	$221,818	$211,927	$193,308		$141,896	$144,085		$111,522	$106,148	$158,788	$72,059

Table S11. Nine-month Salaries, 20 Responses of US CS Private With Tenure-Track Faculty >20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	19	20	18	0	13	19	0	20	16	13	12
Indiv	136	122	103	0	72	155	0	139	128	86	129
10	$134,123	$132,008	$122,763		$98,889	$102,913		$91,206	$50,358	$54,152	$41,227
25	$141,327	$141,975	$128,507		$102,254	$108,421		$95,532	$72,907	$68,053	$45,175
50	$175,661	$161,962	$144,819		$113,130	$116,903		$103,404	$84,923	$94,583	$50,769
75	$206,780	$182,841	$164,945		$126,806	$128,413		$105,926	$97,600	$114,348	$60,149
90	$220,000	$188,142	$185,020		$142,900	$142,212		$110,129	$107,289	$137,686	$70,088

Table S12. Nine-month Salaries, 38 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	34	31	34	4	31	37	3	35	36	22	23
Indiv	187	150	176	13	96	258	12	196	183	127	134
10	$119,238	$117,637	$109,296	*	$91,098	$93,016	*	$84,522	$55,685	$56,667	$42,511
25	$135,797	$129,007	$128,073	*	$97,446	$102,931	*	$90,305	$61,350	$66,874	$48,000
50	$148,672	$141,882	$132,423	$164,945	$103,874	$108,233	$105,401	$95,258	$70,054	$92,943	$55,335
75	$164,803	$165,020	$145,139	*	$110,737	$112,977	*	$99,234	$81,589	$100,346	$63,700
90	$172,477	$178,831	$150,990	*	$120,535	$119,715	*	$103,802	$98,782	$119,208	$68,429

Table S13. Nine-month Salaries, 27 Responses of US CS Public In Midsize City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	21	23	22	3	19	24	2	26	21	13	17
Indiv	99	102	107	43	53	154	21	112	82	53	72
10	$120,786	$113,353	$102,283	*	$94,283	$90,774		$82,508	$50,246	$52,467	$23,282
25	$132,709	$127,478	$118,278	*	$97,353	$99,253		$87,090	$59,063	$74,226	$43,288
50	$143,467	$141,780	$130,495	$165,300	$100,107	$106,195		$93,071	$65,823	$86,420	$50,595
75	$165,747	$154,740	$145,377	*	$114,151	$112,518		$99,620	$75,760	$94,200	$59,391
90	$194,435	$178,211	$162,873	*	$119,566	$117,326		$110,053	$106,195	$105,459	$69,400

Table S14. Nine-month Salaries, 40 Responses of US CS Public in Small City, Town, or Rural, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	29	36	34	3	30	37	3	37	32	12	18
Indiv	106	127	120	10	90	230	12	147	120	41	112
10	$111,877	$116,179	$106,955	*	$92,627	$92,384	*	$81,475	$49,838	$60,127	$42,409
25	$130,492	$121,723	$114,721	*	$97,586	$96,822	*	$84,361	$55,128	$66,286	$46,254
50	$152,683	$136,791	$131,109	$151,840	$100,887	$102,398	$102,540	$88,755	$62,585	$69,637	$51,285
75	$165,120	$153,149	$147,896	*	$112,844	$110,068	*	$93,493	$74,868	$76,647	$57,036
90	$180,088	$165,338	$159,073	*	$120,776	$119,188	*	$99,748	$83,882	$121,622	$61,669

Table S15. Nine-month Salaries, 21 Responses of US CS Private in Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	17	17	20	1	15	20	1	22	20	16	15
Indiv	103	97	97	6	70	142	6	137	140	111	118
10	$116,810	$124,706	$116,163		$91,183	$100,273		$91,530	$54,992	$57,708	$37,354
25	$136,566	$137,694	$127,109		$102,366	$107,690		$95,125	$69,071	$71,769	$43,500
50	$168,300	$155,592	$150,167		$115,103	$117,767		$102,088	$75,612	$95,751	$52,627
75	$196,955	$184,133	$173,941		$129,479	$131,794		$106,767	$85,778	$129,306	$61,250
90	$210,091	$192,746	$214,274		$141,850	$141,857		$110,544	$100,198	$152,573	$70,398

Table S16. Nine-month Salaries, 11 Responses of US CS Private in Other than Large City, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	8	9	8	1	5	9	1	10	6	6	7
Indiv	54	40	38	17	17	46	1	43	19	18	47
10	*	*	*		*	*		$91,443	*	*	*
25	*	*	*		*	*		$100,969	*	*	*
50	$171,472	$176,358	$148,577		$103,791	$113,900		$103,404	$87,159	$77,875	$55,000
75	*	*	*		*	*		$110,036	*	*	*
90	*	*	*		*	*		$110,464	*	*	*

Table S17. Nine-month Salaries, 9 Responses of 30 US Computer Engineering Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	7	8	7	3	8	8	2	8	6	4	4
Indiv	37	31	34	13	17	45	7	26	18	7	12
10	*	*	*	*	*	*		*	*	*	*
25	*	*	*	*	*	*		*	*	*	*
50	$148,905	$151,196	$112,785	$120,000	$99,460	$100,513		$92,003	$64,691	$89,660	$51,145
75	*	*	*	*	*	*		*	*	*	*
90	*	*	*	*	*	*		*	*	*	

Table S18. Nine-month Salaries, 12 Responses of 21 US Information Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	6	10	11	0	10	12	0	12	11	7	8
Indiv	22	48	50	0	51	93	0	90	111	24	26
10	*	$108,002	$129,221		$81,803	$88,470		$77,852	$29,296	*	*
25	*	$126,514	$134,682		$94,042	$103,612		$86,351	$57,125	*	*
50	$132,991	$140,817	$138,232		$105,891	$107,608		$92,945	$71,901	$84,333	$46,949
75	*	$174,557	$164,358		$120,563	$116,812		$99,023	$79,595	*	*
90	*	$184,985	$187,055		$160,879	$125,337		$106,156	$88,987	*	*

Table S19. Nine-month Salaries, 13 Responses of 26 Canadian Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	Years not given	In rank 8+ years	In rank 0-7 years	Years not given		Teach	Research	Postdoc
Depts	12	12	11	0	11	12	0	12	12	4	11
Indiv	78	85	106	0	84	110	0	43	54	11	128
10	$148,304	$142,106	$118,272		$108,570	$107,412		$88,308	$70,600	*	$34,780
25	$156,073	$150,225	$133,123		$123,807	$113,128		$92,736	$73,418	*	$37,596
50	$165,090	$172,242	$162,000		$139,681	$121,744		$99,565	$83,458	$84,703	$46,620
75	$197,011	$184,905	$169,160		$158,233	$142,560		$114,771	$104,891	*	$52,714
90	$228,270	$199,269	$181,670		$168,215	$156,508		$127,474	$123,099	*	$63,750

Table S20. Nine-month Salaries for New PhDs

	US (CS, CE, and Info Combined)				Canadian			
	Tenure-Track	Non-ten Teaching	Non-ten Research	Postdoc	Tenure-Track	Non-ten Teaching	Non-ten Research	Postdoc
Depts	59	18	17	41	2	0	1	4
Indiv	105	65	19	142	2	0	1	16
10	$82,971	$15,268	$17,829	$40,148	*			*
25	$88,750	$46,230	$46,313	$44,627	*			*
50	$93,000	$61,000	$68,615	$50,000	*			$44,167
75	$98,000	$75,000	$93,449	$58,813	*			*
90	$101,617	$92,399	$139,000	$66,814	*			*

Table S21. Salary Changes for Departments that Reported in Both 2012 and 2013

	US CS (125)	US CE (7)	US I (10)	Canadian (11)
Full Profs	+2.8%	+2.4%	-3.1%	+2.4%
Assoc. Profs.	+1.9%	-0.7%	+0.2%	+2.0%
Asst. Profs.	+2.5%	+4.8%	+2.3%	-4.8%
Non-ten-track teaching faculty	+3.7%	-7.5%	+2.3%	-3.7%
Research faculty	+4.3%	+26.1%	+1.6%	+1.5%
Post doctorates	+3.9%	-1.9%	-4.7%	-14.1%

Figure S1. US CS Department Average Salary, Full Professor in Rank 16+ Years

CRA Taulbee Survey 2013

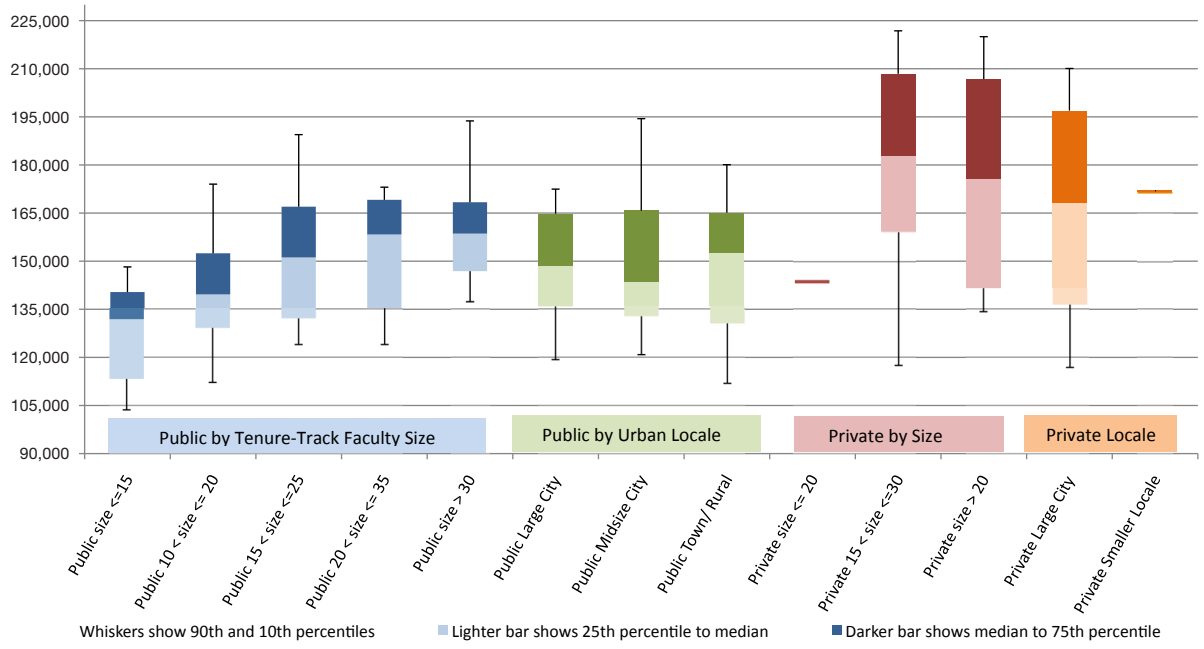


Figure S2. US CS Department Average Salary, Full Professor in Rank 8-15 Years

CRA Taulbee Survey 2013

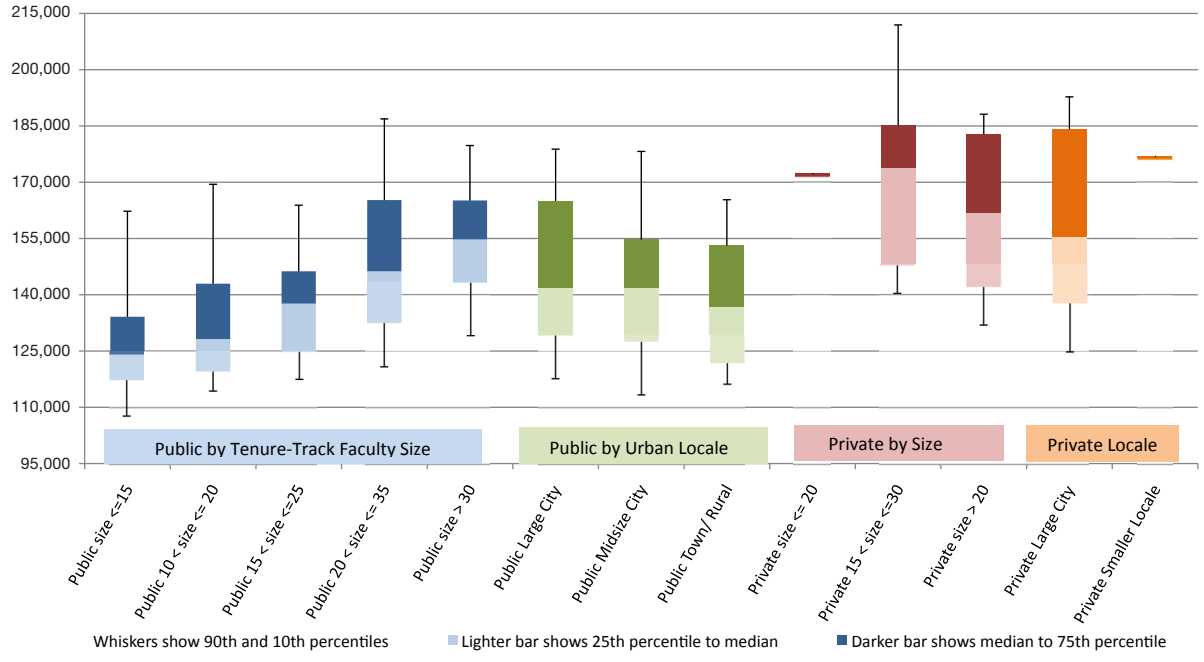


Figure S3. US CS Department Average Salary, Full Professor in Rank 0-7 Years

CRA Taulbee Survey 2013

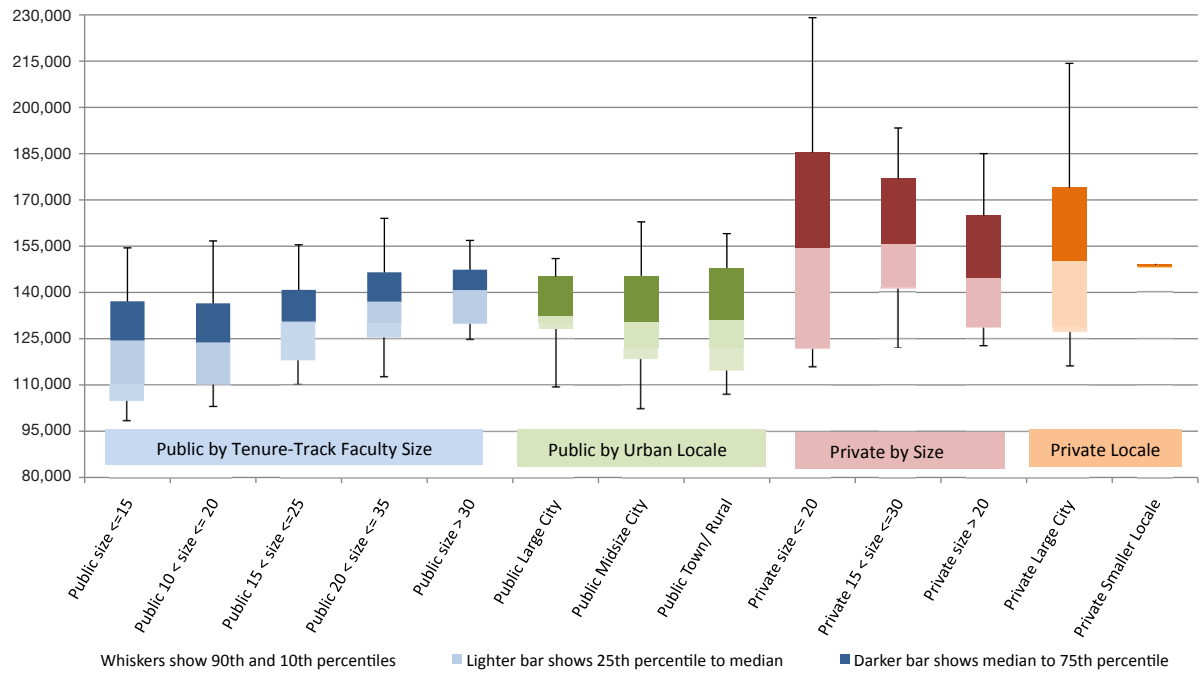


Figure S4. US CS Department Average Salary, Associate Professor in Rank 8+ Years

CRA Taulbee Survey 2013

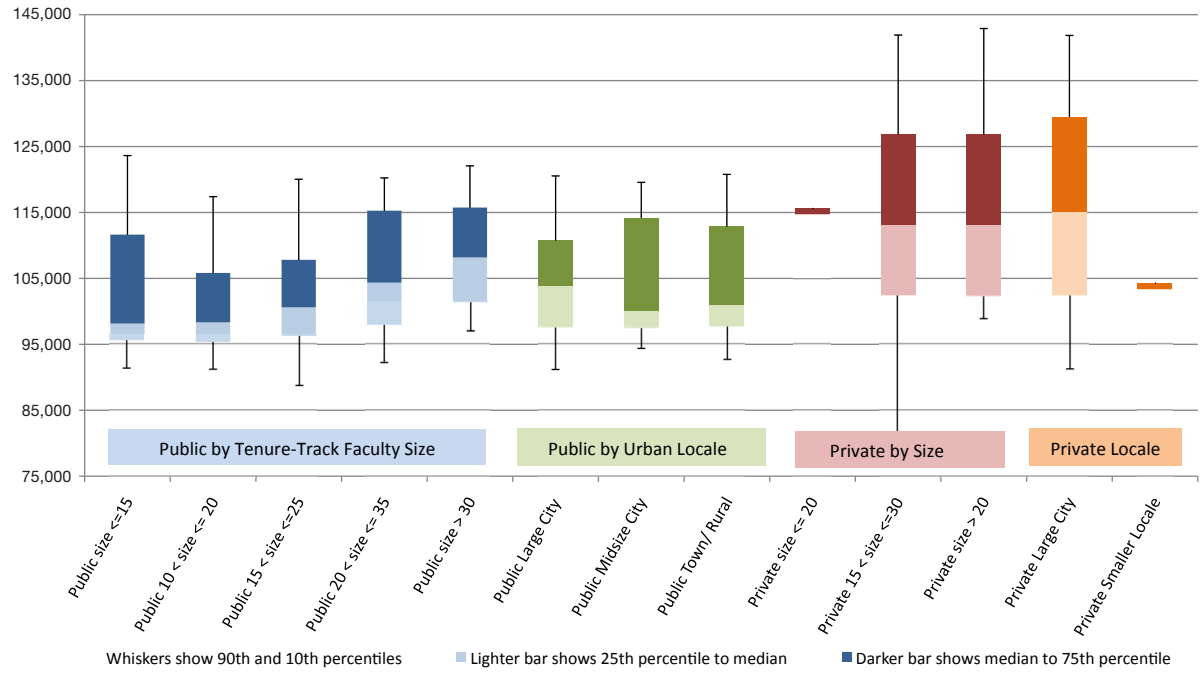


Figure S5. US CS Department Average Salary, Associate Professor in Rank 0-7 Years

CRA Taulbee Survey 2013

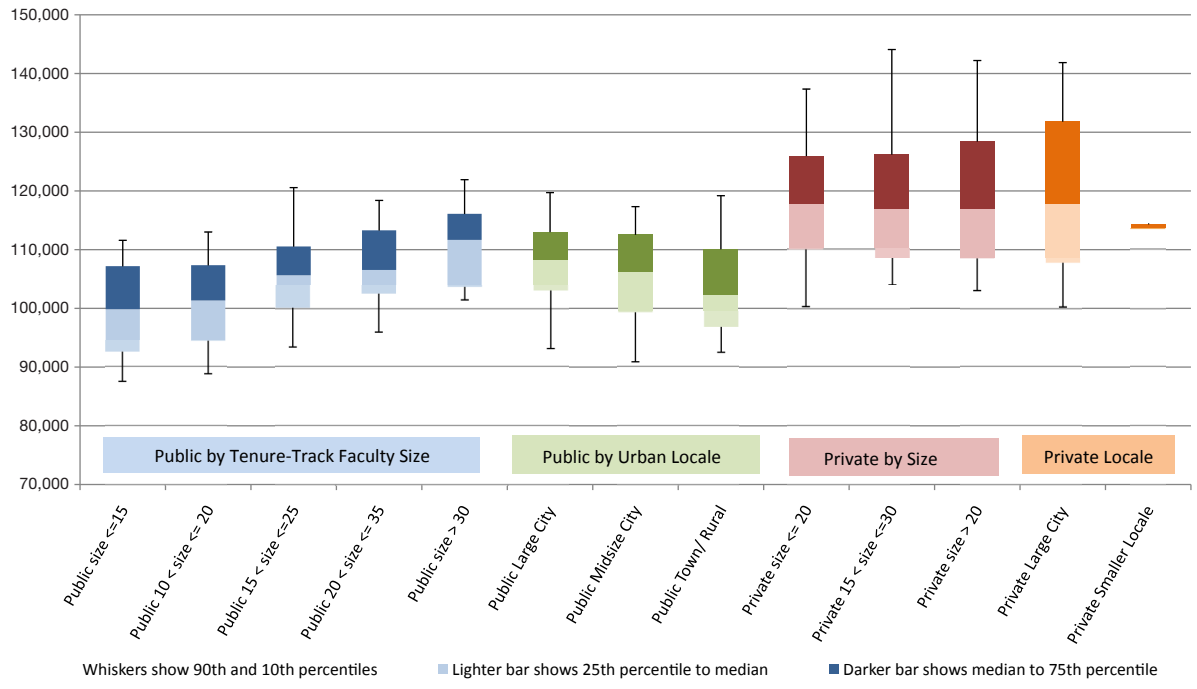


Figure S6. US CS Department Average Salary, Assistant Professor

CRA Taulbee Survey 2013

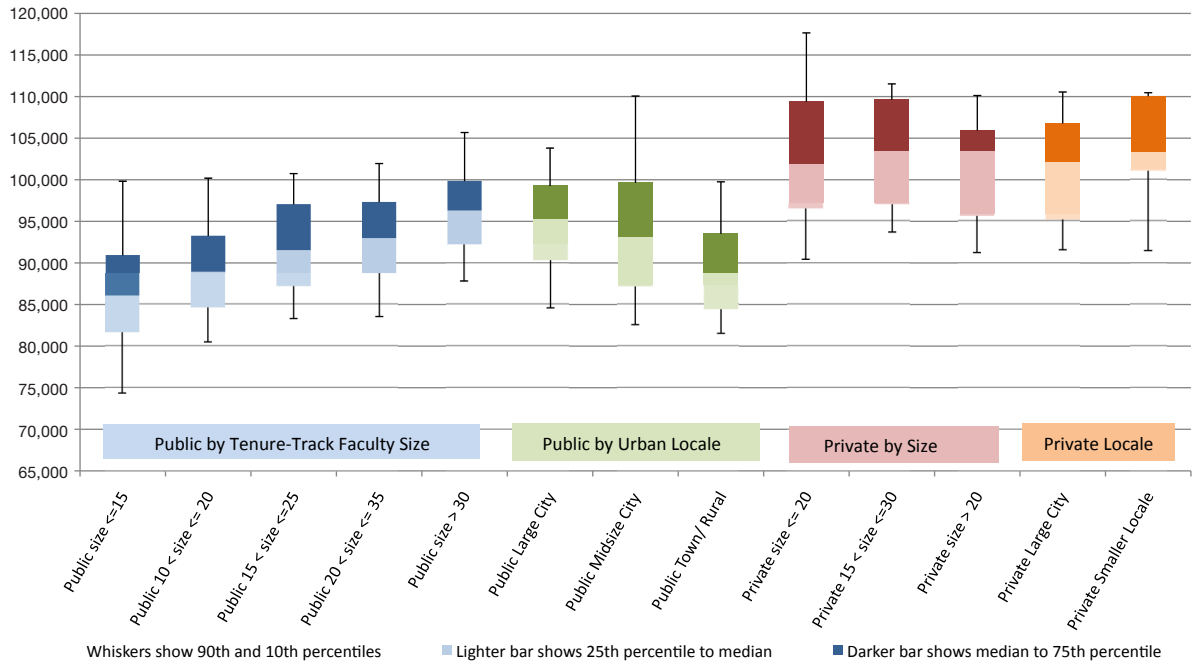


Figure S7. US CS Department Average Salary, Non-Tenure Track Teaching Faculty

CRA Taulbee Survey 2013

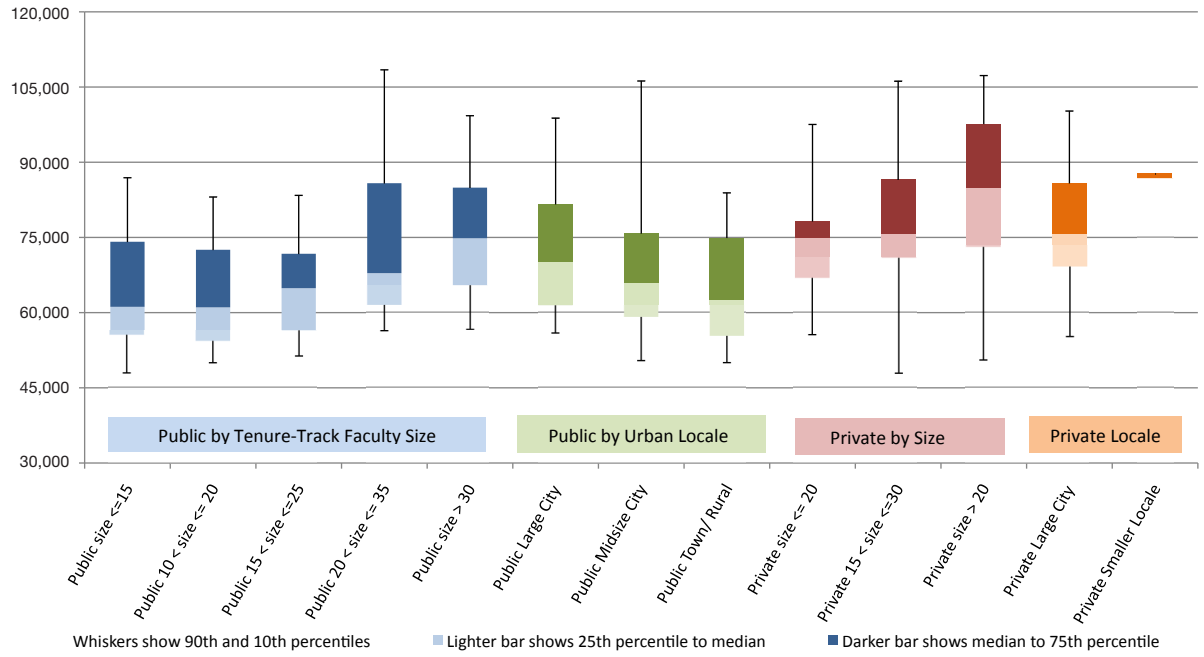


Figure S8. US CS Department Average Salary, Non-Tenure Track Research Faculty

CRA Taulbee Survey 2013

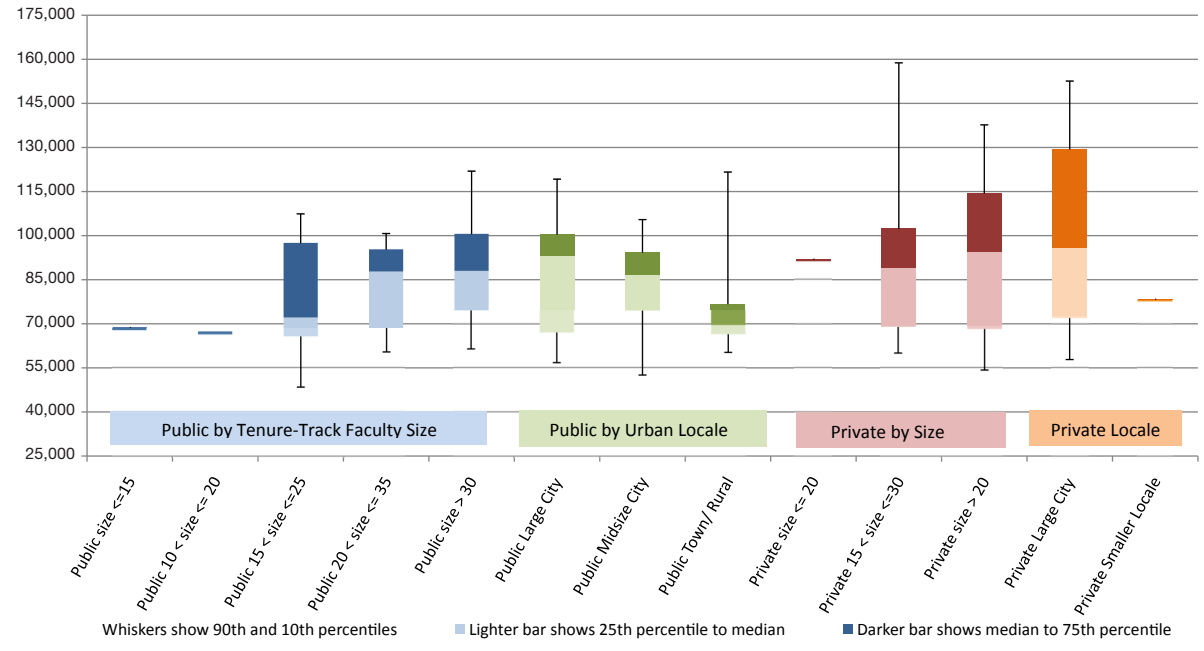
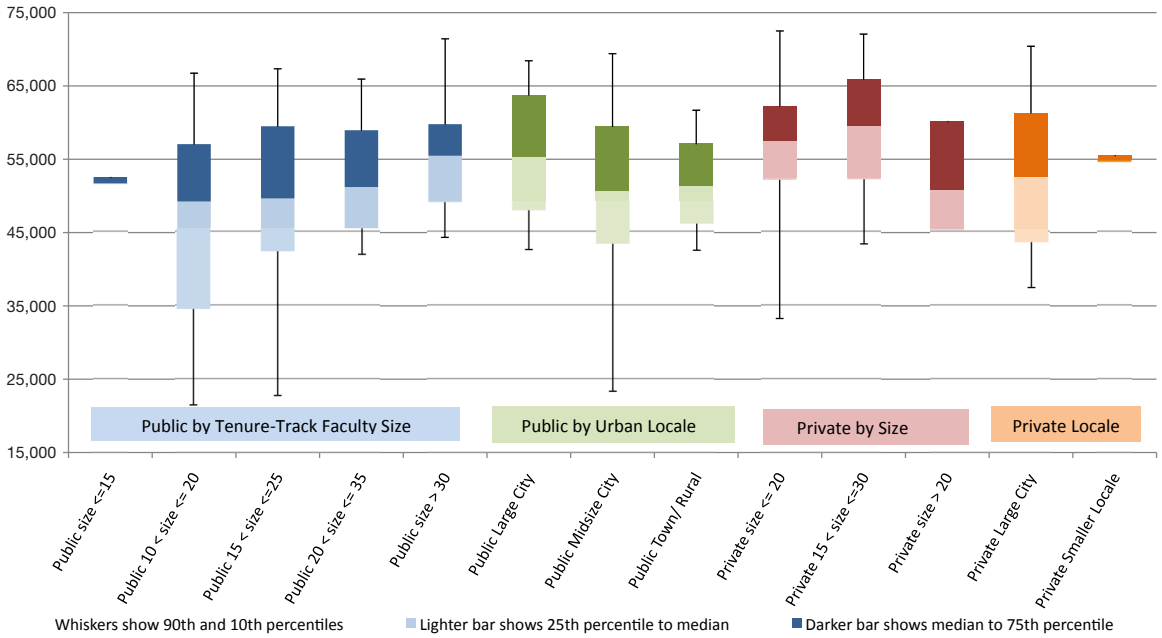


Figure S9. US CS Department Average Salary, Postdoctorates

CRA Taulbee Survey 2013



Concluding Observations

Undergraduate students continue to flock to computing majors, putting increased teaching pressure on the faculty and demonstrating the recognition of computing as a valuable career choice. For the first time in four years, the fraction of doctoral graduates who took tenure-track positions at doctoral-granting departments rose, albeit by a very modest amount. Industry's ability to employ the lion's share of doctoral graduates is impressive, and most of those taking industry positions go into some kind of research position. There seems to be ample and diverse opportunity for doctoral graduates to pursue their chosen field.

Participating Departments

US CS Public (105): Arizona State, Auburn, Clemson, College of William & Mary, Colorado School of Mines, Colorado State, Florida International, Florida State, George Mason, Georgia Tech, Indiana, Iowa State, Kansas State, Kent State, Louisiana State, Michigan State, Michigan Technological University, Mississippi State, Missouri Science & Technology, Montana State, Naval Postgraduate School, New Mexico State, North Carolina State, North Dakota State, Ohio State, Ohio, Oklahoma State, Old Dominion, Oregon State, Pennsylvania State, Portland State, Purdue, Southern Illinois (Carbondale), Stony Brook (SUNY), Temple, Texas A&M, Texas Tech, Universities at Albany and Buffalo (SUNY), Universities of: Alabama (Birmingham and Tuscaloosa), Arizona, Arkansas, Arkansas at Little Rock, California (Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, Santa Barbara, and Santa Cruz), Central Florida, Colorado (Boulder), Connecticut, Delaware, Florida, Georgia, Hawaii, Houston, Idaho, Illinois (Chicago and Urbana Champaign), Iowa, Kansas, Kentucky, Louisiana at Lafayette, Maryland (College Park and Baltimore County), Massachusetts (Amherst and Boston), Michigan, Minnesota, Mississippi, Missouri (Columbia), Nebraska (Omaha and Lincoln), Nevada (Las Vegas and Reno), New Hampshire, New Mexico, North Carolina (Chapel Hill and Charlotte), North Texas, Oklahoma, Oregon, Pittsburgh, Rhode Island, South Carolina, South Florida, Tennessee (Knoxville), Texas (Austin, Dallas, and El Paso), Utah, Vermont, Virginia, Washington, Wisconsin (Madison and Milwaukee), Wyoming, Virginia Tech, Washington State, Western Michigan, and Wright State.

US CS Private (37): Boston University, Brown, Carnegie Mellon, Case Western Reserve, Columbia, Cornell, Dartmouth, DePaul, Drexel, Duke, Florida Institute of Technology, Harvard, Illinois Institute of Technology, Johns Hopkins, Lehigh, MIT, New York University, Northeastern, Pace, Polytechnic, Princeton, Rensselaer, Rice, Rochester Institute of Technology, Stanford, Stevens Institute of Technology, Toyota Technological Institute at Chicago, Tufts, Universities of: Chicago, Notre Dame, Pennsylvania, Rochester, Southern California, and Tulsa, Washington in St. Louis, Worcester Polytechnic Institute, and Yale.

US CE (10): Florida Institute of Technology, North Carolina State, Princeton, Purdue, Santa Clara, Universities of: Illinois (Urbana Champaign), Iowa, New Mexico, and Southern California, and Virginia Tech.

US Information (13): Cornell, Drexel, Indiana, Penn State, Purdue (IT), Syracuse, University at Albany (SUNY), Universities of: California (Berkeley), Maryland (Baltimore County), Michigan, North Carolina (Chapel Hill), Pittsburgh, and Washington.

Canadian (14): Concordia, Dalhousie, McGill, Memorial University of Newfoundland, Simon Fraser, Universities of: Alberta, British Columbia, Calgary, Manitoba, Ottawa, Toronto, Victoria, and Waterloo, and York University.

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[1]The title of the survey honors the late Orrin E. Taulbee of the University of Pittsburgh, who conducted these surveys for the Computer Science Board until 1984, with retrospective annual data going back to 1970.

[2]Information (I) programs included here are Information Science, Information Systems, Information Technology, Informatics, and related disciplines with a strong computing component. Surveys were sent to CRA members, the CRA Deans group members, and participants in the iSchools Caucus (www.ischools.org)who met the criteria of granting Ph.D.s and being located in North America. Other I-programs who meet these criteria and would like to participate in the survey in future years are invited to contact survey@cra.org for inclusion.

[3]Classification of the population of an institution's locale is in accordance with the Carnegie Classification database. Large cities are those with population >= 250,000. Mid-size cities have population between 100,000 and 250,000. Town/rural populations are less than 100,000.

[4]All ethnicity tables: Ethnic breakdowns are drawn from guidelines set forth by the U.S. Department of Education.

[5]These comparisons are different from those reported in the March 2014 sneak preview article in CRN. This is because we discovered that some bachelor's degree data was reported incorrectly by departments last year. See also end note 6. The discovery was made after the sneak preview article was published. We regret this error.

[6]Normally, we would provide comparative data with 2011-12 about bachelor's degrees by gender and by ethnicity. However, we are unable to do so. When reviewing the bachelor's degree data reported this year and comparing it with last year's data, we observed discrepancies that appeared odd. More detailed investigation revealed that some departments reported their bachelor's degree data inaccurately last year. We were able to obtain corrected total 2011-12 bachelor's degrees for these departments, but did not obtain corrected 2011-12 gender and ethnicity data from them. Hence, comparisons against any bachelor's degree data by gender or ethnicity that was reported last year would be inappropriate. We caution our readers to not use the bachelor's degree data from last year's Taulbee Survey articles. The corrected bachelor's degree data by department type appears in this article's Table B1(2012). Table 1 also reflects these corrections. Total bachelor's enrollment and new student enrollment data, and master's and doctoral student degree data, were unaffected by these errors.

[7]All faculty tables: The survey makes no distinction between faculty specializing in CS vs. CE programs. Every effort is made to minimize the inclusion of faculty in electrical engineering who are not computer engineers.

Table B1 (2012 UPDATED). Bachelor's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	105	6,932	67.2%	1,365	63.7%	1,004	41.2%	9,301	62.4%
US CS Private	37	2,248	21.8%	268	12.5%	278	11.4%	2,794	18.8%
Total US CS	142	9,140	88.5%	1,633	76.2%	1,282	52.6%	12,055	80.9%
US CE	9	0	0.0%	406	18.9%	0	0.0%	406	2.7%
US Info	9	0	0.0%	0	0.0%	1,116	45.8%	1,116	7.5%
Canadian	14	1,182	11.5%	104	4.9%	38	1.6%	1,324	8.9%
Grand Total	174	10,322		2,143		2,436		14,901	

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Professional Opportunities

Academia Sinica, Taipei, Taiwan

Research Center for Information Technology Innovation

Director Position

Academia Sinica in Taiwan invites applications and nominations for the position of Director of the Research Center for Information Technology Innovation (CITI). The initial appointment is for a period of three years (renewable for a second term), and will also carry the title of Research Fellow. Much of the scientific affairs can be conducted in English.

As the pre-eminent academic research institution in Taiwan, Academia Sinica is devoted to basic and applied research in mathematics and physical sciences, life sciences, and humanities and social sciences. CITI has the mission of engaging in cutting-edge research in emerging information technologies and studying their industrial implications. Current research foci include ubiquitous computing, mobile computing, wireless communications, embedded systems, dependable computing, computer vision, machine learning, data sciences and computer security. CITI is well funded and blessed with a group of young and energetic researchers. CITI maintains a high research standard with a high-quality publication record. For details about Academia Sinica and CITI, please see http://www.sinica.edu.tw.

Interested candidates should have a Ph.D. or equivalent degree, with outstanding research accomplishments and demonstrated leadership ability. Besides pursuing a rigorous research program at CITI, the successful candidate is expected to build on the existing strengths of CITI, develop new research thrusts, and provide intellectual leadership in information technology and related industrial activities.

Applications and nominations, including a cover letter, a complete curriculum vitae, a publication list, and names and contact information of three references, should be emailed to Dr. Hsiang-Tsung Kung, Chair of the CITI Director Search Committee, at searchciti@gate.sinica.edu.tw.

Screening of applications/nominations will begin immediately, and will continue until the position is filled.

Boston University

Postdoctoral Associate in Learning Analytics

Boston University's Digital Learning Initiative (http://www.bu.edu/dli), in conjunction with the Hariri Institute for Computing (http://www.bu.edu/hic), are looking for a postdoctoral candidate to engage in innovative research in learning analytics, including, but not limited to, experiments and analyses related to Boston University's MOOCs (Massive Open Online Courses).

More details are available at: http://www.bu.edu/dli/2014/04/17/postdoc

College of William & Mary

Department of Computer Science

One-Year Non-Tenure-Track Position

The Department of Computer Science at the College of William & Mary invites applications for a one-year non-tenure-track position that begins August 10, 2014. Renewal for subsequent years is contingent on satisfactory performance and availability of funds. Responsibilities include teaching three undergraduate sections per semester, with course assignment based on experience and abilities.

A degree in Computer Science or a closely-related discipline is required; preference will be given to candidates with a Ph.D. at the time the appointment begins. Prior teaching experience and an interest in advising undergraduates is particularly welcome.

Application Instructions

Applicants must apply using William & Mary's online recruitment system (https://jobs.wm.edu). The Position Number is F0831W. Submit a current c.v. and cover letter that includes a statement of teaching philosophy. Student evaluations from courses taught are welcome, but not required. You will be prompted to submit online the names and email addresses of three references who will be contacted by us with instructions on submitting a letter of reference.

For full consideration submit all materials by the review date, May 9, 2014, Applications received after the review date will be considered only if needed.

The College is an EO/AA Employer. The College conducts background checks on applicants for employment.

Desert Research Institute (DRI)

Applied Innovation Center (AIC)

Technical Lead for Analytics and Computation

DRI is seeking a Technical Lead that will be responsible for leading the computational components of the Applied Innovation Center (AIC) projects, providing day-to-day oversight and supervision of relevant activities, and supporting R&D activities. The AIC aims to develop commercially relevant solutions to real-world problems through the integration of data analysis, cyber-physical systems, high performance computing, and advanced visualization, prototyping, and tool development.

Qualifications: Master's in Science, Engineering or related field; 8 years' experience in successfully developing and managing large multi-collaborator projects; 8 years of experience working with High Performance Computing systems.

Visit our website at http://jobs.dri.edu for a complete description and application details.

DRI is an AA/EEO/disability/protected veteran employer

Lausanne

Post-doctoral Position in Privacy and Security

EPFL/LCA1, led by Prof. Jean-Pierre Hubaux, is committed to laying the foundations and developing the tools to protect privacy in tomorrow's hyper-connected world. We are recruiting a post-doctoral researcher in the areas of **network privacy and security**, with an emphasis on mobile/wireless networks, and on **data privacy and security**, with an emphasis on health-related data (including genomic data).

More information about our research activities can be found at: http://people.epfl.ch/jean-pierre.hubaux.

Required skills and expertise:

- Very good knowledge of written and spoken English (French is not required)
- Strong background in security, privacy, and applied cryptography
- Some background knowledge in networking and/or databases, electronic health records, genomics, game theory, microeconomics, machine learning would be an asset
- Strong analytical skills
- Good knowledge of languages and tools such as C, C++, Java, Python, and MatLab

Education: a PhD degree in computer science, electrical engineering, communication systems, computer engineering, or a similar area; with a strong publication track record in information security and privacy.

Mission: The contribution to the research efforts of the group will involve many interactions with PhD and undergrad students, senior researchers, and external partners (from industry, academia, and hospitals); some participation in teaching is also expected. The research activities will mainly revolve around the design and the validation of

Professional Opportunities

protocols and algorithms; some supervision of prototype development might be involved.EPFL offers top research facilities and very competitive salary conditions and is an equal opportunity employer.

Starting date: to be agreed upon, but the earlier the better. The duration of employment is flexible, with an upper bound of 4 years.

If you are interested in this position and believe that you qualify, please send (preferably by **May 15, 2014**) a cover letter, a research statement (including notably how you would contribute to our activities), a résumé with a list of publications (please highlight the two most relevant ones), and the names, e-mail addresses, and phone numbers of at least 3 references to: jean-pierre.hubaux@epfl.ch. Please mention "Application to Post-Doctoral Position LCA1-2014" in the title of your e-mail.

FX Palo Alto Laboratory, Inc.

Research Scientists

FX Palo Alto Laboratory (FXPAL) is seeking talented research scientists to join our lab as regular or visiting employees (e.g. post doc or faculty sabbatical). FXPAL's research spans multimedia, information access, smart spaces, and remote collaboration. The following research area is of particular interest, although we will consider exceptional candidates in other related areas.

Collaborative Spaces and Telepresence
This candidate will join an existing, technically diverse team working on a variety of presence and communication technologies. We seek candidates with backgrounds in multimedia systems, ubiquitous computing, distributed systems, and/or human-computer interaction. Ideal candidates will have prior experience working on communication tools and/or telepresence applications.

Data Mining and Visual Analytics
The ideal candidate has expertise in analysis, visualization and management of media such as text, image, video, and audio. Ideal candidates will also have experience in network analysis as applied to social and enterprise media such as microblogs, forums, and emails and/or data visualization and interactive large-scale data applications. Fluency with tools supporting the collection, organization and processing of large structured and unstructured data sets is desirable.

Both positions require a Ph.D. in Computer Science or related field and strong development skills.

About FXPAL
We provide multimedia and document services technology research for Fuji Xerox Co., Ltd. Our mission is to research and invent new technologies, to cooperate with Fuji Xerox business units to develop technologies and to interact with the US software industry to deliver new products for the Fuji Xerox market.

To Apply
Please email your resume to: fxpalresumes@fxpal.com. We are an equal opportunity employer and value diversity in the workplace.

Research Director–NLP, Speech Processing

ETS (Educational Testing Service) is headquartered in Princeton, NJ with a mission to advance quality and equity in education by providing fair and valid assessments, performing educational research and influencing policies that promote learning, performance, education and professional development.

Currently we are seeking a Research Director of the Natural Language Processing (NLP) and Speech Group to lead a team of 26 scientists and engineers in the research and development of innovative technologies to improve assessment. The Director also leads research that encourages the appropriate use of these technologies in operational settings and advances the state of the art in NLP and speech processing research in the education domain.

Specifically, you will be responsible for conceptualizing and pursuing a research agenda of fundamental and applied research in NLP and speech processing that will address current needs and anticipate future needs of education and assessment. This includes the development of technologies to automate or facilitate scoring of open-ended responses, support practices for developing tests and learning materials, safeguard the security and validity of assessments, enable technology-rich environments for assessment and learning, and provide automated performance feedback.

To qualify, you must possess:

• A Doctoral degree in computer science, computational linguistics, linguistics, electrical engineering, or a related field

• Eight years of progressively more independent research experience providing evidence of continuing and substantial contributions to a field of study are necessary, with experience managing research staff and transitioning the outcomes of research into operational practice desirable.

• Excellent verbal and written communications skills, including public speaking, interpersonal and public relations skills, and writing and editing skills.

We offer a competitive salary and excellent compensation package including medical, dental, vision, 403(b) retirement plan, life and disability insurance, paid time off and an employee assistance program.

Please apply at:
www.ets.org/careers

With more than 3,400 global employees worldwide, ETS develops, administers and scores more than 50 million tests annually in more than 180 countries, at 9,000+ locations worldwide. In addition to assessments, we conduct educational research, analysis and policy studies and develop a variety of customized services and products for teacher certification, English language learning and elementary, secondary and postsecondary education. Equal Opportunity Employer

Professional Opportunities

FLORIDA INTERNATIONAL UNIVERSITY

Florida International University is a comprehensive university offering 340 majors in 188 degree programs in 23 colleges and schools, with innovative bachelor's, master's and doctoral programs across all disciplines including medicine, public health, law, journalism, hospitality, and architecture. FIU is Carnegie-designated as both a research university with high research activity and a community-engaged university. Located in the heart of the dynamic south Florida urban region, our multiple campuses serve over 50,000 students, placing FIU among the ten largest universities in the nation. Our annual research expenditures in excess of $100 million and our deep commitment to engagement have made FIU the go-to solutions center for issues ranging from local to global. FIU leads the nation in granting bachelor's degrees, including in the STEM fields, to minority students and is first in awarding STEM master's degrees to Hispanics. Our students, faculty, and staff reflect Miami's diverse population, earning FIU the designation of Hispanic-Serving Institution. At FIU, we are proud to be 'Worlds Ahead'! For more information about FIU, visit *fiu.edu*.

The School of Computing and Information Sciences seeks exceptionally qualified candidates for non-tenure track faculty positions at the level of Instructor.

Non-tenure track instructor positions (Job ID#_507474)

We seek well-qualified candidates in all areas of Computer Science and Information Technology. Ideal candidates must be committed to excellence in teaching a variety of courses at the undergraduate level. A graduate degree in Computer Science or related disciplines is required; significant prior teaching and industry experience or a Ph.D. in Computer Science is preferred.

Florida International University (FIU) is the state university of Florida in Miami. It is ranked by the Carnegie Foundation as a comprehensive, doctoral research university with high research activity. The School of Computing and Information Sciences (SCIS) is a rapidly growing program of excellence at the University, with 36 faculty members and over 1,800 students, including 80 Ph.D. students. SCIS offers B.S., M.S., and Ph.D. degrees in Computer Science, an M.S. degree in Telecommunications and Networking, and B.S., B.A., and M.S. degrees in Information Technology. SCIS has received approximately $26M in the last five years in external research funding, has 14 research centers/clusters with first-class computing infrastructure and support, and enjoys broad and dynamic industry and international partnerships.

HOW TO APPLY:

Qualified candidates are encouraged to attach a cover letter, curriculum vitae, listing of three references, statement of teaching philosophy, in a single pdf file. To receive full consideration, applications and required materials should be received by May 15, 2014. Review will continue until position is filled.

Applications should be submitted directly to the FIU Careers Website at *careers.fiu.edu*; refer to Job ID# 507474. Further information can be obtained from the School website *http://www.cis.fiu.edu*, or by e-mail to *recruit@cis.fiu.edu*.

FIU is a member of the State University System of Florida and is an Equal Opportunity, Equal Access Affirmative Action Employer.

Professional Opportunities

The George Washington University, Washington, D.C.

Department of Electrical & Computer Engineering

Chair and Tenured Full Professor

The George Washington University invites applications for a tenured full-professor position and the Chair of the Department of Electrical & Computer Engineering (ECE), to begin in Fall Semester 2014. This is an exciting opportunity for an outstanding person to lead the ECE Department. The George Washington University is located in the nation's capital, with close access to many federal funding agencies and government research laboratories. More information about the Department is available at http://www.ece.seas.gwu.edu/.

The Department offers ABET-accredited B.S. programs in Electrical Engineering and Computer Engineering, M.S. programs in Computer Engineering, Electrical Engineering, and Telecommunications Engineering, and Ph.D. programs in Electrical Engineering and Computer Engineering. The Department has grown rapidly over the last few years, both in size and stature, and is poised to grow further in the near future under the leadership of the next Chair. The Department has a strong sponsored research program including several NSF CAREER/Young Investigator grants as well as major grants from a range of Federal agencies, such as an NSF Industry/University Research Center. The Department plays a pivotal role in two University-funded academic strategic excellence programs in High-Performance Computing and Nanotechnology and runs an experimental supercomputing data center. The University is constructing a new 500,000 square foot Science and Engineering Hall (http://seh.gwu.edu/) which is expected to open later this year and will be the largest building dedicated to science and engineering research in the nation's capital, housing state-of-the-art facilities, such as a Class 100 nanofabrication facility, and many advanced research and instructional laboratories.

Responsibilities:

The successful candidate will be expected to demonstrate a strong commitment to excellence in teaching and research and to the success of our students. Equally, the Chair will vigorously catalyze and develop further the Department's collaborations with other departments of the School, attract new partners across the University, and advance and extend the existing relationships with nearby government laboratories. The Chair will be an enthusiastic proponent of creativity, innovation, and outreach and is expected to be an effective leader in raising resources and increasing the stature of the Department.

Basic Qualifications:

Applicants must have an earned doctorate in Electrical Engineering, Computer Engineering, or a related field, and outstanding research and academic achievements that make the candidate suitable for appointment as a full professor. S/he must have a demonstrated capability as a visionary leader, with a strong funded research portfolio that evidences multidisciplinary expertise, which can complement and expand existing departmental strengths and the proven ability to teach effectively, at both graduate and undergraduate levels.

Application Procedure:

To apply, complete the online faculty application, at http://www.gwu.jobs/postings/20918 and upload (i) a cover letter, (ii) a detailed CV and (iii) a vision statement of research and education and (iv) full contact information for five professional references. Only complete applications will be considered. Review of applications will begin on April 18, 2014 and will continue until the position is filled.

EEO/AA Policy

The George Washington University is an Equal Opportunity and Affirmative Action Employer. Applications from women and underrepresented minority groups are strongly encouraged.

The George Washington University, Washington, D.C.

School Of Engineering & Applied Science

Chair and Tenured Full Professor, Department of Computer Science

The George Washington University invites applications for a tenured full-professor position as Chair of the Department of Computer science, to begin as early as Summer 2014. This is an exciting opportunity for an outstanding person to lead and expand an established, thriving and growing department.

GW is the largest university in the nation's capital with close access to many Federal funding agencies and research laboratories. The University offers comprehensive programs of undergraduate and graduate liberal arts studies as well as degrees in engineering, law, medicine, public health, education, business and international affairs. Thanks to a recently adopted strategic plan, GW is committed to creating several multidisciplinary research institutes, including three computation-centric institutes with up to 18 new faculty lines to be filled. Also, in support of its emphasis on research in science and technology, the University is constructing a new 500,000 square foot Science and Engineering Hall in the heart of campus, which includes state-of-the-art research and instructional laboratories, clean rooms, imaging facilities, and much more. The School of Engineering and Applied Science, including the CS Department, will move into the building in Spring 2015.

The Department of Computer Science has 20 full-time faculty members, a large adjunct faculty pool, and 650 students, and offers B.S., B.A., M.S. and Ph.D. degree programs in Computer Science, and an M.S. degree program in Cybersecurity. Its educational and research programs span core as well as cutting-edge areas, with funding from various agencies. Additionally, the University is a federally-designated Center of Academic Excellence in Research in security. Embarked on rapid growth, the Department has hired nine tenure-track professors in the past five years, and plans to continue hiring for the next several years. For further information please refer to http://www.cs.gwu.edu.

Responsibilities

The new Chair will be expected to lead the Department, supervise all of its resources, and promote and support excellence in teaching and research. Equally, the new Chair will lead in effective recruiting of talented faculty and students, and vigorously catalyze and develop further the Department's collaborations and relationship across the University and with Government and industry. The new Chair will be an active promoter of diversity, an enthusiastic proponent of creativity, innovation and outreach, and an effective advocate and spokesperson for the Department, both within and beyond the University.

Basic Qualifications

Applicants must have a doctorate in Computer Science or a closely related field, evidence of outstanding research and academic achievements with a strong reputation in the research and professional community, and a demonstrated ability to teach effectively at both graduate and undergraduate levels.

Inquiries and Application

Inquiries will be accorded the utmost discretion. To inquire, please email Tom Mazzuchi, Chair of the Search Committee (cschsearch@gwu.edu). To apply, complete the online faculty application, at http://www.gwu.jobs/postings/17254 and upload a detailed CV or resume, full contact information for five professional references and a cover letter that describes your research and teaching accomplishments and your views of growth opportunities in computer science,. References will be expected to address research and teaching skills necessary for appointment at the full professor rank as well as skills for the chair position including leadership, interpersonal, administrative, and mentoring abilities. Only complete applications will be considered. Review of applications will begin on

Professional Opportunities

April 18, 2014 and will continue until the position is filled.

EEO/AA Policy

The George Washington University is an Equal Opportunity and Affirmative Action Employer. Applications from women and underrepresented minority groups are strongly encouraged.

HackerRank

Challenge Curation Manager at Hackerrank

HackerRank is a programming contest platform used by hackers to hone their skills and companies for streamlining the recruiting process. It's free for hackers and we make money by selling a white-labeled version of the platform to companies.

We are at $1M+ revenues with an impressive growth rate, 500k+ hackers and a team of 36 based in Palo Alto & India.

The mission of the company is to construct a world based on meritocracy. The only thing that should matter is skill – not resumes, or the school/company you went to. Here's a platform that helps to hone your skill, self-select the challenges/companies you are interested in and demonstrate the skill.

Description:

There are different skills & domains in CS - AI, ML, security, basic algorithms, front-end, etc. We need to build challenges across all domains and levels and have the infrastructure to objectively evaluate the code that's submitted.

Your role would be to help build a team of freelancers or programmers or professors or companies who can help contribute challenges in the above categories. The role involves finding those people (a lot of them are in our community itself), building a team (part-time/full-time), managing them, constructing a process from the sourcing of challenge to making it live and ensuring the quality of the challenges is very high.

The challenges will be used on public contests or by companies for their recruiting process.

Software is eating the world and we are helping making the entire process faster, cleaner & objective. This is going to significantly change the pace of the world.

If you're interested, please e-mail to vivek [at] hackerrank with your profile link and why you're the best person for the role. We'd like to hire the best person for the role, hence remote is also okay but prefer Palo Alto or India.

Hawai'i Pacific University

Department of Computer Science

Lecturer

The Department of Computer Science at Hawai'i Pacific University invites applications for a full-time position as Lecturer, beginning August 2014. A M.S. in Computer Science or a closely related field and at least 3 years of experience teaching college students is required. A strong commitment to undergraduate teaching is essential, with a teaching load of twelve contact hours per semester. We are looking for someone with both experience and enthusiasm for teaching the introductory sequence of Java language classes, up through data structures and algorithms. Abilities to bring state-of-the-practice competencies such as software engineering, mobile applications, cybersecurity to upper-level students is a plus.

To apply or learn more about this job, please visit our website at: www.hpu.edu/employment

We are proud to be an EEO/AA employer of minorities, women, protected veterans and individuals with disabilities. We maintain a drug-free workplace and perform pre-employment substance abuse testing.

Oak Ridge National Laboratory

Computer Science and Mathematics Division

Post-Master's Research Associate in Systems Programming

ORNL is seeking outstanding recent Master's graduates interested in systems programming to work in extreme scale computing. Help enable the best and most productive use possible of emerging exa-scale high-performance computers and develop revolutionary approaches to reducing time-to-solution of extreme-scale computing and computational science problems.

To apply visit: https://www3.orau.gov/ORNL_TOppS/Posting/Details/519

Ohio University

School of EECS

Tenure Track Assistant Professor Position

The Russ College of Engineering and Technology at Ohio University invites applications for a full-time, benefits-eligible, tenure track assistant professor position in computer science. The selected applicant will be expected to perform excellent research, teaching, and service in computer science. Candidates should have an earned doctorate in computer science or a related discipline. Candidates are expected to have strong research potential as well as an interest in teaching at both the undergraduate and graduate levels. Departmental support will include initial reduced teaching loads, competitive salary and generous start-up funds. Candidates from all research areas are welcomed, but preference will be given to candidates with expertise in secure and dependable software systems (i.e., software certification, verification, or validation; formal methods in software engineering; or cybersecurity).

Position will remain open until filled; for full consideration please apply by June 10th, 2014.

For details and to apply, go to: http://www.ohiouniversityjobs.com/postings/9544

Ohio University

School of EECS

Tenure Track Assistant Professor Position

The Russ College of Engineering and Technology at Ohio University invites applications for a full-time, benefits-eligible tenure track assistant professor position in electrical/computer engineering. The selected applicant will be expected to perform excellent research, teaching, and service in electrical or computer engineering. Candidates should have an earned doctorate in electrical or computer engineering or a related discipline. Candidates are expected to have strong research potential as well as an interest in teaching at both the undergraduate and graduate levels. Departmental support will include initial reduced teaching loads, competitive salary and generous start-up funds. Candidates from all research areas are welcomed, but preference will be given to candidates with research expertise in embedded systems, cyber physical systems, or computer architecture that would support the Computer Engineering focus in our undergraduate and graduate programs.

Position will remain open until filled; for full consideration please apply by June 10th, 2014.

For details and to apply, go to: http://www.ohiouniversityjobs.com/postings/9545

Samsung Advanced Technology

Privacy Researcher

Position Summary:

Samsung's Advanced Technology is located in San Jose, California is currently recruiting world-class professionals who share our "Innovation through Passion" philosophy and thrive in a fast-pace, cross

Professional Opportunities

team, results-driven environment, with focus on highly visible, challenging, and cross discipline projects.

The successful candidate will have a keen interest and understanding of privacy and security issues in big data systems such as location-based system and social networks, in particular how they relate to device-to-cloud convergence. The ideal candidate is familiar with the formal foundations of privacy and security and has a strong desire to work on problems with real-world potential and impact. The candidate will be a part of a research team and is expected to participate and lead some of the research efforts.

Implementation skills and the ability to create early-stage prototypes are also desirable.

Common Essential Duties & Responsibilities:

- Contribute to the research activities of our privacy team; participate and lead some of the research efforts.
- Formulate research problems based on real-world needs and independently
- conduct high-quality research.
- Work with existing research and development staff on a broad range of research topics.

Background / Experience:

Expertise in one or more of the following areas:

- Privacy and security in distributed and/or cloud computing environments
- Usable technologies for privacy identity management and big data and identity management in Internet and cloud-based applications.
- Applied cryptography (secure multi-party computation, homomorphic encryption)
- Privacy preserving/enhancing technologies (differential privacy, k-anonymity etc.)
- Big data systems such as location-based system and social networks.
- Proven track record of research and publications on privacy or a related field

Necessary Skills / Attributes:

- Excellent communication skills and willingness to work with an international team to deliver rapid prototypes
- Ph.D. in Computer Science, Electrical Engineering, or related field

Samsung Information Systems America is an Equal Employment Opportunity Employer

Please contact: Amy.mcghie@partner.samsung.com or 408 544-3018.

Tufts University / Human-Robot Interaction (HRI) Laboratory

Postdoctoral Research in Situated Natural Language Understanding

The Human-Robot Interaction (HRI) Laboratory at Tufts University under the direction of Professor Matthias Scheutz is looking for a postdoctoral researcher in the area of "situated natural language understanding" for immediate start. The goal is to develop novel methods for integrating the different parts of the natural language processing chain (from speech recognition, to syntactic and semantic parsing, to pragmatic analysis and dialogue) in a way that fully utilizes the situatedness of robots. This includes making use of contextual information (such as perceptions, task and goal knowledge as well as mental models of interlocutors, in addition to discourse context) to constrain possible interpretations and overcome disfluencies and other infelicities of spontaneous speech.

We are looking for a highly motivated, energetic researcher who wants to leave a mark on the field by developing the next generation of robots capable of unprecedented natural language interactions. The position is for two years, renewable for another three years with full benefits (including health and dental insurance, flexible spending accounts, and voluntary retirement plan). Salary is competitive, commensurate with experience.

Requirements:

The ideal candidate is a team player with demonstrated research and system building experience in natural language understanding and robotics (although the robotic background is much less critical) who will lead algorithm and software development in situated natural language understanding and disseminate research results in top-rate venues, and also help with the supervision of graduate students.

For questions about this position, please contact Professor Matthias Scheutz at matthias.scheutz@tufts.edu.

UMass Medical School and UMass Amherst

Postdoctoral Research Associate

Overview

We are seeking 1~2 highly motivated postdoctoral research associate to join the Biomedical Natural Language Processing (BioNLP) group at UMass Medical School and UMass Amherst. This position will primarily be located at the UMass Medical School in Worcester, MA. The BioNLP group is actively pursuing many exciting projects including: information retrieval, information extraction, summarization, question answering, data mining, and patient-centered research. A highly productive candidate may transition to a faculty position.

Responsibilities

The successful candidates will help investigate new algorithms to support our current research thrusts. This will require extensive experience with data mining (DM) and natural language processing (NLP).

Qualifications

Candidates for this position should have a PhD in Computer Science or related field and a significant research record including publications in top conferences and journals in:

- Natural Language Processing,
- Machine Learning,
- Data Mining or Data Analysis

Proficiency in quantitative analytical methods and strong programming skills (e.g., python, matlab, java, C/C++, weka, etc.), along with extensive research experience in hands-on machine learning (ML) and data mining (DM), is essential. Additional experience in bioinformatics or figure search and analysis is desirable.

Successful applicants will join a vibrant collaborative research environment, will work closely with clinical investigators and senior personnel in the lab, and should have the ability to work effectively both independently and as part of a multidisciplinary team. The position will be for one year, renewable annually, starting Summer or Fall 2014.

Application

Please apply by email to Prof. Hong Yu at hong.yu@umassmed.edu and include a brief letter of introduction, a CV including list of publications in PDF format, and names and email addresses of 2-3 referees.

Background

Please see http://www.bio-nlp.org/postdoc-ad-2014.txt for more information. Competitive Salary based on experience.

United States-Israel Educational Foundation

Fulbright Israel Post-Doctoral Fellowships for American Researchers in All Academic Disciplines 2015/2016 – 2016/2017

The United States-Israel Educational Foundation (USIEF), the Fulbright commission for Israel, plans to offer 8 fellowships to American post-doctoral researchers in support of work to be carried out at Israeli universities during the course of the 2015/2016-2016/2017 academic years.

Professional Opportunities

The US Post-Doctoral Fellowship Program is open to candidates in all academic disciplines.

Holders of tenure track positions are not eligible to apply. Individuals who have already begun research activities in Israel prior to the application date are not eligible.

Program grants total $40,000, $20,000 per academic year.

Program fellows must be accepted as post-doctoral researchers by Israeli host institutions, which agree to provide them with a standard post-doctoral grant, which they will receive in addition to their Fulbright Fellowship. Thus, the total financial support received by Program Fellows is likely to be in the range of at least $35,000-$40,000 per year.

Applications for 2015/2016-2016/2017 Fulbright Post-Doctoral Fellowships must be submitted to the Council for International Exchange of Scholars by August 1, 2014.

The full Program announcement is available at http://bit.ly/P5TyWH.

Potential candidates may contact Ms. Judy Stavsky, Deputy Director, USIEF (jstavsky@fulbright.org.il; +972-3-517-2392) for advice and assistance.

University of Chicago

Lecturer - Req # 02129

The Masters Program in Computer Science (MPCS) at the University of Chicago invites applications for the position of Lecturer. This is a three year full-time teaching position, with possibility of renewal, and involves teaching six courses across the four academic quarters of the year (Fall, Winter, Spring, Summer).

Teaching duties will involve: (1) teaching an "Immersion Programming" class for students who are entering the MS program with no prior programming experience, (2) teaching a core Programming class following the Immersion Programming class, with (3) the remaining teaching load fulfilled by teaching core and elective classes in the Lecturer's field of expertise. Candidates with a Systems background (Computer Networks, Operating Systems, Computer Architecture, etc.) will be given preferred consideration.

The successful candidate will have exceptional competence in teaching and superior academic credentials. Applicants must have a Ph.D in Computer Science or a related field at time of appointment and have experience teaching Computer Science at the undergraduate or graduate level. The selection committee may also consider candidates without a Ph.D only if they have exceptional teaching credentials and at least a masters degree in a related field.

The Masters Program in Computer Science (http://csmasters.uchicago.edu/) is a terminal MS degree in Computer Science that provides a rigorous introduction to the foundations of Computer Science, while also providing in-depth and hands-on instruction in cutting-edge and industry-driven topics, including Web and Mobile Application Development, Big Data, Cloud Computing, Data Analytics, etc. The program attracts a diverse mix of students including full-time students who are typically no more than 5 years out of college, part-time students who already work in industry, and international students.

The Chicago metropolitan area provides a diverse and exciting environment. The local economy is vigorous, with international stature in banking, trade, commerce, manufacturing, and transportation, while the cultural scene includes diverse cultures, vibrant theater, world-renowned symphony, opera, jazz and blues. The University is located in Hyde Park, a Chicago neighborhood on the Lake Michigan shore just a few minutes from downtown.

Applicants must apply on line at the University of Chicago Academic Careers website at http://tinyurl.com/mpcs-lecturer-2014. Applicants must upload a curriculum vitae and a one page teaching statement. In addition, three reference letters will be required. Review of complete applications, including reference letters, will begin June 1, 2014, and continue until the position is filled.

All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, age, protected veteran status or status as an individual with disability. The University of Chicago is an Affirmative Action / Equal Opportunity / Disabled / Veterans Employer.

University of Maryland

Center for Complexity in Business

Postdoctoral Research Fellowship

The Center for Complexity in Business (ter.ps/ccb) at the University of Maryland's Robert H. Smith School of Business seeks applications for a postdoctoral fellowship for 2014-2015. Candidates will be expected to work primarily on interdisciplinary projects that examine and analyze the diffusion of information in social media. The position is for at least one year. Applications will be reviewed starting immediately.

To apply send a vita, a short research statement, letters of recommendation, and a writing example. This packet should be sent to Carol Cron (ccron@rhsmith.umd.edu).

University of Massachusetts Medical School

Department of Quantitative Health Sciences

Postdoctoral Research Associate

Overview:

We are seeking 1~2 highly motivated postdoctoral research associates to join the Biomedical Natural Language Processing (BioNLP) group at UMass Medical School (UMMS) and UMass Amherst. This position will primarily be located at the UMass Medical School in Worcester, MA. The BioNLP group is actively pursuing many exciting projects including:

information retrieval, information extraction, summarization, question answering, data mining, and their applications to the biomedical domain.

Responsibilities:

Successful candidates will help investigate new algorithms to support our current research thrusts. This will require extensive experience with data mining, natural language processing, or social networking analysis.

Qualifications:

Candidates for this position should have a PhD in Computer Science or related field and a significant research record including publications in top conferences and journals in:

- Natural Language Processing
- Machine Learning
- Data Mining

Proficiency in quantitative analytical methods and strong programming skills (e.g., python, matlab, java, C/C++, weka, etc.), along with extensive research experience in hands-on machine learning and data mining, is essential. Additional experience in bioinformatics or figure search and analysis is desirable.

Successful applicants will join a vibrant collaborative research environment, will work closely with clinical investigators and senior personnel in the lab, and should have the ability to work effectively both independently and as part of a multidisciplinary team. The position will be for one year, renewable annually, starting Summer or Fall 2014.

Application:

Please apply by email to Prof. Hong Yu at hong.yu@umassmed.edu and include a brief letter of introduction, a CV including list of publications in PDF format, and names and email addresses of 2-3 referees. As an equal opportunity and affirmative action employer, UMMS recognizes the power of a diverse community and encourages applications from individuals with varied experiences, perspectives and backgrounds.

Professional Opportunities

Background:

Please see http://www.bio-nlp.org/ for more project information.

Competitive Salary based on experience.

University of North Florida

School of Computing

Advisor-Instructor

Instructor position in School of Computing at University of North Florida.

Details and application can be found at: http://www.unf.edu/ccec/computing/Employment/Jobs.aspx

University of South Florida

Computer Science, Computer Engineering, and Information Technology

Instructor Positions

Applications are invited for three Instructor positions in the Department of Computer Science and Engineering. We are seeking two instructors who can teach a broad range of Computer Science and Computer Engineering core and elective courses at the undergraduate level. We are seeking one instructor who can teach a broad range of Information Technology courses. These are 9-month appointments. Opportunities may exist to teach in the summer, if so desired. The Instructor position offers a University-defined promotion path. Salary will be commensurate with qualifications and experience. Candidates must have completed, or be near completion of, a Ph.D. degree in computer science, computer engineering, information technology, or a related discipline. For exceptionally qualified candidates an M.S. degree may be considered. Successful candidates are expected to start Fall 2014.

The Department of Computer Science and Engineering (http://www.cse.usf.edu) has 31 faculty members including Instructors and offers B.S., M.S., and Ph.D. degrees. The undergraduate program graduates approximately 175 students per year and this is expected to grow. The University of South Florida is one of the nation's top public research universities.

For further information and for application instructions, please see our faculty search website: http://www.cse.usf.edu/faculty-search/. For questions please send email to faculty-search@cse.usf.edu. Applications will be considered starting immediately until the positions are filled.

The University of South Florida is an Equal Opportunity/Equal Access/Affirmative Action Institution. Women and minorities are strongly encouraged to apply. Dual career couples with questions about opportunities are encouraged to contact the Department chair.

University of South Florida

Computer Engineering and Information Technology

Tenure-Track Faculty Positions

Applications are invited for two tenure-track positions in the Department of Computer Science and Engineering. The Department is seeking to hire to support the programs of Computer Engineering and Information Technology. Preference will be given to candidates with research areas that complement current Departmental research. Candidates should have an established record of independent research with outstanding-quality research publications and with potential for excellence in teaching. Candidates must have completed, or be near completion of, a Ph.D. in computer science, computer engineering, information technology, or a related discipline. Successful candidates are expected to start Fall 2014.

The Department of Computer Science and Engineering (http://www.cse.usf.edu) has 31 faculty members including Instructors and offers B.S., M.S., and Ph.D. degrees. Department faculty members have research funding from NSF, NIH, DARPA, Google, and other sources. The University of South Florida is one of the nation's top public research universities.

For further information and for application instructions, please see our faculty search website: http://www.cse.usf.edu/faculty-search/. For questions please send email to faculty-search@cse.usf.edu. Applications will be considered starting immediately until the positions are filled.

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University of Utah

Director, Center for High Performance Computing

The University of Utah is seeking an innovative and entrepreneurial Director to lead its Center for High Performance Computing (CHPC). CHPC is an active participant within the emerging Condo of Condos national consortium, XSEDE Campus Champions, CASC, Internet2, GENI, and Utah EPSCoR. Reporting to the Deputy CIO, the Director is responsible for developing the facility and creating an effective management structure that promotes the adoption of innovative research computing, a nimble academic service environment, and ongoing professional development among the staff.

Master's degree (Ph.D. strongly preferred) or equivalent research training in computer science or a computationally intensive science or engineering discipline, 5+ years of progressive leadership experience in high performance research computing, and strong collaborative skills as demonstrated through leadership of scientific or computational partnerships. Successful proposal writing and collaboration experience with diverse faculty teams is highly desirable. Previous research computing experience in an academic setting or other research environment also is highly desirable.

For further information and to apply, please visit: https://utah.peopleadmin.com/postings/30116

EQUAL EMPLOYMENT OPPORTUNITY

The University of Utah is an Affirmative Action/Equal Opportunity employer and is committed to diversity in its workforce. In compliance with applicable federal and state laws, University of Utah policy of equal employment opportunity prohibits discrimination on the basis of race or ethnicity, religion, color, national origin, sex, age, sexual orientation, gender identity/expression, veteran's status, status as a qualified person with a disability, or genetic information. Individuals from historically underrepresented groups, such as minorities, women, qualified persons with disabilities, and protected veterans are strongly encouraged to apply. Veterans' preference is extended to applicants, consistent with University policy and Utah state law.

To inquire about this posting, email: employment@utah.edu or call 801-581-2300. Reasonable accommodations in the application process will be provided to qualified individuals with disabilities. To request an accommodation or for further information about University AA/EO policies, please contact the Office of Equal Opportunity and Affirmative Action, 201 S. Presidents Cr., Rm 135, (801) 581-8365 (V/TDD), email: oeo@umail.utah.edu.

Washington State University

Assistant Professor in Software Engineering

WSU College of Engineering and Architecture is seeking a full-time tenure-track Assistant Professor in Software Engineering located in Pullman, WA.

For more information and to apply, please visit https://www.wsujobs.com/postings/9623.

WSU is an EO/AA Educator and Employer.

Professional Opportunities

Washington State University

Clinical Associate Professor in Cyber Physical Systems/Security

WSU College of Engineering and Architecture is seeking a full-time Clinical Associate Professor in Cyber Physical Systems/Security located in Pullman, WA.

For more information and to apply, please visit https://www.wsujobs.com/postings/10169.

WSU is an EO/AA Educator and Employer.

Washington State University

Tenure-Track Faculty in Data Science

WSU College of Engineering and Architecture is seeking to fill two full-time tenure-track faculty positions in Data Science located in Pullman, WA.

For more information and to apply, please visit: https://www.wsujobs.com/postings/10050.

WSU is an EO/AA Educator and Employer.