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Computing Research Association (CRA) is an organization which started in 1972 focused in North America, mostly in the United States. Its purpose is to enhance innovation by joining industry, government, and academia to strengthen research and advanced education in computing. The members of the CRA include the PhD granting departments of universities in North America. There are 200-plus universities that are members as well as major research laboratory, for example, IBM, Google, Facebook, and national laboratories like Los Alamos National Lab, San Diego National Lab. All of the major IT organizations are also affiliates, for example, ACM, IEEE, AAAI, and so on.

CRA has a permanent staff and is headquartered in Washington DC. It has roles for advocating with the government in terms of computing research to increase funding for research, and it also organizes activities to help computer science and computer engineering departments function. Every other year, in July, there's Snowbird Conference. It brings together department heads for all computer science and engineering departments in North America as well as leadership of these national laboratories. They have 2-day meeting where they talk about things of importance to computing. For example, a recurrent situation for computing department is there booming enrollments in computing majors. This has become a problem for the departments in terms of trying to teach those majors.

CRA has board of directors. I'm on that board. There are 18 people that are elected nationally in the country to serve on that board and they provide guidance. We have meetings twice a year. There are four major subcommittees of the CRA. One is Computing Community Consortium (CCC), and their role is to understand what are the major research trends in computing and where should they be advocating. There's another one called Center for Evaluating the Research Pipeline (CERP). This is a committee that was started by my committee, which was started by CRA-W. CERP's goal is to provide evidence as to things related to diversity. We're trying to understand issues and show that our programs were effective. CRAE stands for the CRA Committee on Education focusing on undergraduate education on the right ways to teach education in computer science, as well as potentially think about things going down to the K-12 area. CRA has decided to focus on research. Traditionally, CRA have been looking at the undergraduate levels and above including training for people beyond graduate programs.

CRA-W is the CRA Committee on the Status of Women in Computing Research. It has been going since 1991. The goal of CRA-W is to increase the success and participation of women in computing research and education at all levels. Again, we have focused our programs from the undergraduate level up.

I am currently the co-chair together with Julia Hirschberg who is a professor and the department chair of computer science at Columbia

University. The CRA Board is elected by the department chairs of computer science. Everyone on this board runs a project. One of our criteria is they're all very established researchers. We wanted to ensure that people have established their credentials academically and research-wise before we give them this additional service obligation.

Our goal is to get more women into computing research. If there aren't enough women in graduate school, we will not be able to get them to go further on. If there are less of them in graduate school, we will have to convince them as undergraduate that they should be interested in graduate school. We have programs that target at the undergraduate level that try to get students excited about research. In graduate school, we have programs that try to help them build community and be successful in graduate school and retain them in graduate school. Then, we have programs that are targeted at people that are in the early and midcareer stages of their career. We call them Career Workshops because we also focus researchers that are in research labs.

I will now talk about different programs. We spend more than $2 million a year on our programs. In order to do that, we have to raise money. We get some of the funding from the National Science Foundation by writing proposals. We have recently also gotten the Department of Energy to fund some of our programs, but we also get funding from industry.

One of our programs called the Grad Cohort Workshop is funded entirely by funds raised from industry. Some of our board members' job is just to raise funds. Everyone on the board is volunteers. Those funds are basically spent on our programs. At the CRA National Office, we have two full-time staff members and another half-time staff member.

One of the undergraduate programs I've been running in summer since 2010 is called the Distributed Research Experiences for Undergraduates (DREU) Program. Students from all over the US or Canada apply to our program and so do professors who are willing to host a student for summer undergraduate research experience in their lab. It's a 10-week experience similar to other summer undergraduate research programs. We pay the student $7000, or $700 a week, which is intended to give them some compensation, as well as to pay for their housing. We also fund their relocation travel, because we try to send them to a university that's not their home university to give them a different experience and to help them distinguish themselves for graduate school applications by having a letter of reference from a professor who is not from home institution.

CERP is Center for Evaluating the Research Pipeline. Our undergraduate research programs are essentially about twice as effective as other undergraduate research programs in having our students go on to graduate school. The reason is because our mentors are interested in being mentors. We needed to establish CERP to get information. We have a project called Data Buddies where we survey computer science departments in the country that are willing to do this. We are able to

then compare results for the students in our program versus students who have participated in other undergraduate research programs to see their intentions after graduating. This is often difficult when you are trying to compare effectiveness of your program. Before we had Data Buddies project, we were only able to survey our own participants through pre-and post-survey type analysis. Now, we are able to compare the effects of our programs versus students who had either another kind of program or didn't have any at all.

We also have an academic-year program called Collaborative Research Experience for Undergraduates (CREU). Students come together in a team together with a professor at their own institution and they apply for this program. They write a mini research proposal, and they participate in that research experience throughout the academic year. Each student gets on $1500 a semester, and if they participate in the summer they get $4000. However, we are trying to discourage this program and encourage students to participate in the DREU Program instead in the summer.

One that we started recently is a virtual undergraduate town hall event. About once a month, we have a faculty member or a researcher who will talk about the research and they also have a mentoring topic. It's a virtual thing, and we are working together with ACM and they advertise this through the ACM-W chapters. We have just finished one year of this. It's a good way to make our programs available to students without having them to travel, and US NSF is funding this program.

Programs for graduate students include the discipline-specific workshops and distinguished lecture series. The discipline-specific workshops are typically held together with technical conference. The organizers apply to us to have this. It's held the day before the technical conference begins, and it's intended to help students get to network with other people that will be at the conference so that they can have a better experience at the conference. We also try to get some of the leading researchers in the field to give a talk so that the students get opportunity to meet them. Then, when they go to the conference, the students do not have an isolating experience. Maybe they get a primer on some of the technical materials, especially if it's their first experience at that conference.

In the distinguished lecture series, we provide speakers, both academic researchers as well as researchers at national labs, to go to an institution. We provide speakers for many of the regional celebrations through this program. The speakers will talk about their research, and we also have a graduate school information panel. Our speakers are going to be women and underrepresented minorities so that they get to see these role models who are talking to them about research as well as going on to graduate school.

I have been a director of that program in the past. It's hard to evaluate the effectiveness of that program because it's a one-off lecture event, but in our last grant when we were putting in our renewal to NSF, we were planning to drop that program because we couldn’t’ evaluate it well.

However, the NSF made us add it back. NSF argued that it's not expensive and we are getting role models for people.

Grad Cohort is an event that is 1-1/2 day workshop for graduate women students. We usually hold it in April. We have been running it now for about 10 years. This is addressing the fact that there may be not too many women graduate students at any one institution, but if we bring them all together, they can have this networking experience. Last year, we had 550 students. This is a program that is funded almost entirely by industry. Until 2 years ago, NSF didn't provide any funding. Last year, it cost about $750,000 to run this program, $650,000 were raised from industry. The industry is interested in this because they are interested in employees. If they provide certain level of support, they will get those benefits. Additionally, we also give the industry an access to a resume database including all the students that have applied and that didn't get selected to come. Some of our platinum sponsors have found this to be useful in recruiting for them. Microsoft and Google in particular have been interested in this.

We sponsor some awards. There's this Borg Early Career Award (BECA) given to a woman who early in her career has made significant research contributions, has had a positive and significant impact in advancing women in computing research community, and is relatively early in the career The researchers that win this award can elect to have the award presented at their research conference.

We also coordinate scholarships for this program called SWSIS; it's for women studying information security. This is funded by Hewlett-Packard (HP) and also an association called ACSA. We coordinate the review process and applications. We give out $100,000 in scholarships for that each year. It's awarded to undergraduates or students with Masters Degree and is interested in research. The rationale for not awarding it to PhD students is that they're already being funded for their research.

Our career-mentoring workshops are for early career and midcareer women. The early career would be very senior graduate students like students who are going to go on to job market the same year and also people in the first 5 years of their career. Midcareer are for people who are at the associate professor level but not yet at the full professor level. We have tracks for women who are in research university, in teaching-focused university, and in research labs. These workshops are about 1-1/2 day long, and they were so effective that the men wanted to have a workshop like that for them.

Now, the CRA every other year run one that's for everyone, and on the other year, we run one focused on women. The reason I got involved in CRA-W is because as a graduate student I went to one of these workshops. The workshops cover things that are helping you become effective in your career that are useful for everyone and then there's a panel on work-life balance. We also run mini versions of those workshops as well as panels focused on undergraduates at two conferences that are held in the US

each year, the Grace Hopper Celebration of Women in Computing and the Tapia Celebration of Diversity in Computing.

One of our problems with the Grace Hopper Conference is it has become a gigantic job fair. We don't want students who would be potentially interested in graduate school to be sucked off into the job market. We have started a new program at Grace Hopper, which we call the Grace Hopper Conference Research Scholars. There, we help them navigate the conference by signaling out to them some of the research-focused presentations, and we also have an event for them at the beginning and towards the end where we get them together and get them to meet our research members. Based on last year's experience, we will continue doing that.

CRA-W had its 25th anniversary last summer. That means 25 years ago, there was a problem we needed to help women succeed in computing research and we still need to. Hopefully, it won't be around in another 25 years so on.

Q&A/Comments Session

Q1: How do mentors find time to volunteer in the program? Is there any mechanism to let them work?

Nancy Amato
That's definitely true. One of the things we've managed to do with CRA-W is it's viewed as very prestigious to be on this board. For me, it's a tremendous honor that I'm the co-chair. The other thing is it's fun to be on this board. The steering committee meets twice a year, and the board meeting meets once a year. I have worked with many different groups such as IEEE Robotics and Automation Society, but this one is a lot more fun. Why our programs are effective is the people involved have a passion for it, and we care about the students and it shows with our results. You need to find the right people to run these activities. It can become tiring. We did have someone we had to ask to leave the board because she wasn't able to fulfill her responsibilities. She became a vice president for research at an institution. So, we are careful about who is involved.

Q2: I see that CRA-W is successful in offering workshop and lectures for female students and someone early in career, because of very passionate members who are waiting to become mentors or organize programs. Another reason I thought CRA-W is successful is corporate sponsorship. Platinum sponsor need to pay $125,000. Usually, it means corporations see some opportunities for recruiting excellent young researchers. That's why Grace Hopper became gigantic job fair. Don't you feel the same tendency in those events?

Nancy Amato
Yes, definitely. Even the $5000 bronze sponsor can come and provide a small number of people to come to the event and interact with the students and they get access to the applicants. Academic departments

can also sponsor grad cohort. We also provide them a list of applicants. The students who have participated in the undergraduate program if they are interested in going on to graduate school, the departments are interested in recruiting those students. When the graduates of our program are graduating with a PhD, if they're interested in going to an academic, the academic institutions are interested in knowing about that. That's one of the reasons they're interested in sponsoring our program and that's certainly the reason why Microsoft is sponsoring it at a $100K for a long time for this program. Hopefully, some of them are also doing it just for the right reason, that we need to improve the field. That's why NSF support us.