Building an Effective Computer Science Student Organization:
The Carnegie Mellon *Women@SCS* Action Plan (1)

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Abstract
This paper aims to provide a practical guide for building a student organization and designing activities and events that can encourage and support a community of women in computer science. This guide is based on our experience in building Women@SCS, a community of women in the School of Computer Science (SCS)(2) at Carnegie Mellon University. Rather than provide an abstract "to-do" or "must-do" list, we present a sampling of concrete activities and events in the hope that these might suggest possibilities for a likeminded student organization. However, since we have found it essential to have a core group of activist students at the helm, we provide a "to-do" list of features that we feel are essential for forming, supporting and sustaining creative and effective student leadership.

1. Brief Background

In 1999, the number of undergraduate women students entering Carnegie Mellon's Computer Science Department reached 38% (50 out of 130)—up from 7% (7 out of 96) in 1995. The factors that contributed to this dramatic increase have been well documented by Fisher and Margolis [1, and see 2 in this special issue] and Blum [3]. Briefly, between 1995 and 1999 a number of *key actions* came into play:

- Summer workshops for high school teachers of Advanced Placement Computer Science were held on campus.
- Allan Fisher, (then) Associate Dean for Undergraduate Computer Science Education, advised the Carnegie Mellon Admissions Office that prior programming experience was not a pre-requisite for success in the computer science major.
- About the same time, Raj Reddy, (then) Dean of Computer Science, requested that the Admissions Office develop criteria that could help select future visionaries and leaders in computer science.
- The Admissions Office started placing high value on activities that demonstrated commitment to "giving back to the community" in addition to top grades and SAT scores.

Thus, a new vision for the SCS undergraduate student body was formed that would influence changes in the recruitment of computer science majors —-changes that would lead to the increased enrollment of women and *indeed* to a significant transformation of the culture of computing at Carnegie Mellon [4]. Importantly, these and subsequent developments have been undertaken with *essential support from top administrators, including the President of the University.*(3)

The new admissions criteria have not affected our students' ability to succeed in the computer science major. Indeed, other than creating various entry points into the freshman programming courses, no major changes have been made in the undergraduate curriculum. We attribute this positive outcome in large measure to the student organization *Women@SCS*, and in particular, to its Advisory Council.

2. Student Leadership: The *Women@SCS* Advisory Council

With the dramatic increase in the number of women entering our computer science program in the Fall 1999, we were faced with a great opportunity —-and a great challenge. It seemed clear we would be in danger of losing many of our new recruits if we were to conduct business as usual within the atmosphere of a traditional computer science department.(4) Hence it seemed critical to work closely with students who might guide us to appropriate action. And so, the *Women@SCS Advisory Council* (known here simply as 'the Council') was born.

By the Fall 2000, the Council had a total of 23 students and had separated into a graduate sub-Council of 12 students and an undergraduate sub-Council of 11 students. The separation was necessary because of divergent interests between the younger students (who preferred a combination of social and mentoring activities) and the more professional/research oriented graduate students (who preferred focused discussions and professional networking activities). Connections between the sub-Councils continued to be maintained by holding regular joint meetings.(5)

By October 2001, the Council had doubled to a total of 46 students (22 undergraduates and 24 graduates). All four years of the undergraduate level are now represented, and most of the graduate departments. We have found that a core group of Council members are extremely active and partici-

pate on a regular basis while other members attend meetings and help out with events whenever they can. This situation has proved to work well. Council members are under no pressure to do Council work but will happily help out when called upon. At the same time, the more regularly active members can hold leadership positions within the Council, direct meetings, instigate discussions, and plan events.

The Council has turned out to be *the* driving force behind our pro-active efforts to improve the academic and social climate for all women in SCS. As the Council has grown and thrived, so have the numbers of women students who attend the Council's programs of events and activities. As the Council has become a respected part of the SCS 'institution,' the atmosphere for all students in SCS has greatly improved. Thus we strongly believe, *building an energetic, action-oriented Advisory Council is key to building a successful community of women in the computer sciences.*

Some Essentials for Building an Effective Council

Faculty and Institutional Support
The Council needs a dedicated Faculty Advisor who is willing to spend time and energy listening, advising, and promoting the interests of the group throughout the department, school and the university. Our Faculty Advisor has formed strong ties and support networks on behalf of women students. At the same time she has formed a close and mutually respectful relationship with Council members. This gives them a strong sense of self worth. The Faculty Advisor readily acts as a bridge to other faculty and administrators. Initially, Council members give input into curriculum and climate through the Faculty Advisor, and in this way contribute to real change.

Program Coordinator
Hire a Program Coordinator to help with the day-to-day organization of activities, events, and meetings and work closely with the Faculty Advisor and the Council. Members of the Council are keen to invest their time, energy, and ideas for the good of the community. However, *it is vital that the Council has organizational support so that its members maintain good academic standing and do not "burn out."* Our Program Coordinator oversees the Women@SCS web site, networks throughout the University with staff, faculty, and administrators in arranging the Council's events and activities, and has become a sounding board for members' ideas and questions.

Meetings
Arrange regular Council meetings with an agenda and a set time. Our Council holds weekly (one hour) meetings for undergraduate members, twice monthly for graduate members, and joint meetings once a month. Members organize future events, review past activities, comment on classes and curriculum issues, brainstorm and share ideas, and review

the web site. Meetings also provide a safe, non-judgmental environment where members can ask for help, and give it in return. We hold recruiting sessions once a semester to inform all women in SCS about the Council and its goals. Occasionally a guest, usually faculty or administrator or campus visitor, is invited. This allows Council members to meet faculty and administrators on an entirely new level for an exchange of ideas and information. Articles by Cuny and Aspray [see 5 in this special issue], and Fox [6] point out how *this kind of personal involvement with faculty and administration has been found to be particularly important to women students.*

Council Leaders
Elect Council leaders. We have found that Council members are happy to have leadership from the "senior" members, and that it works best to have two leaders (within each sub-Council) who will be responsible for collecting meeting agendas, leading the meetings, acting as general spokeswomen and coordinating with the Faculty Advisor and Program Coordinator.

Web Site
Set up a student-run web site to represent your organization and increase its visibility. The *Women@SCS* web site, with a link from the SCS home page, has become a focal point for announcing activities, for highlighting and celebrating the many special accomplishments of women throughout SCS, and for providing resource information to women students and beyond. The web site is reviewed at Council meetings and all members are encouraged to submit event announcements and items of interest. See, <http://www.cs.cmu.edu/~women/>.

Rooms
Make sure you are given a "real" meeting room and not a classroom. We have found that the venue has helped to affirm the worth of the Council and its decision-making.

Distribution Lists
Set up distribution lists of all women in the department or school (faculty, staff, graduates, undergraduates). The D-lists have become an essential tool for our voluminous amounts of email communication. D-lists not only provide an efficient tool for disseminating ideas, getting feedback, announcing meetings and events, but also for tracking the numbers of women throughout the department/s.

Funding
Funding from the department, school, and especially from the highest levels within the university, is essential for the Council to put its plans into action. Funding at this level also gives value and credibility to the goals of the Council, credibility to women's issues and the need to improve the quality of life for women in computer science. Funding of *Women@SCS* has proved to be a very positive investment for

the department and the university as a whole. We have been fortunate in having administrative and financial support from the University, via the President, and from the SCS Alumni/External Relations office. The many computing-related companies, who are keen to recruit on campus, have also provided helpful funds.

Giving Back
Your Council can become an asset to the department, school and the university as a whole. Carnegie Mellon's Computer Science Department has called upon the *Women@SCS* undergraduate sub-Council to provide direct input on issues such as the curriculum, advising, and climate. Recently, members of the Council were invited to participate on a panel discussion, held in San Francisco, to examine future practices for Alumni development. This year, the *Women@SCS* Council was featured in local newspapers [7] and on public television <www.pbs.org/ttc/hottopics/comp-sci.html>. It is clear that our Council, and by extension the community of women in the School of Computer Science, have now become a very articulate and visible asset.

3. Building a Community of Women in Computer Science: Events and Activities organized by the *Women@SCS* Advisory Council
As Blum observes [8], an important but nevertheless little acknowledged component of professional training, and success, consists of the professional interactions that take place in social settings. Thus, the events designed by the *Women@SCS* Advisory Council generally combine professional *and* social activities that help foster community, confidence and growth.

There is no dearth of ideas generated by the Council and, indeed, the level of energy expended is extraordinary. This is mitigated in part by the fact that a fresh crop of students joins forces each year. But even more, we have observed the paradoxical, and yet clichéd, outcome: namely that 'energy produces energy' and that 'to give is to receive.' Indeed, Council members are the greatest beneficiaries of their involvement in running the show, for example, in terms of their increased professional experiences, contacts and growth, their self-esteem, and their academic and leadership successes and awards.

Events and Activities

Professional and/or Mentoring Events and Activities
(See Key to Symbols[6]. Also, see [9] in this special issue.)

- Freshmen Orientation Session (U, W): In a social gathering, Council members talk to freshmen about their work and life in the Computer Science Department.[y]
- Big Sisters/Little Sisters (U, G, W): This program pairs a more "senior" Big Sister with a Little Sister and provides an informal, but organized, set-up for support, mentoring, and friendship, centered around a number of social events.

Sisters are encouraged to email and meet outside of the organized activities. We have found that some students prefer this one-on-one set up while others prefer group-mentoring activities –we feel both formats are important. (A sample of our initial Sisters' letter/questionnaire can be found on our mentoring web page. See <http://www.cs.cmu.edu/~women/resources/mentoring.shtml>.) [f]
- Pre-registration Event and Passing the Torch (U, WM): The first event serves as a mid-year opportunity for providing general advice on the class registration process. The second event is held at the end of the academic year as senior women prepare to graduate and others prepare to advance their year. *Words of wisdom* given at these events include tips on succeeding, on what works, what doesn't, and recommendations on classes and professors. These events serve to remind students that others have been through similar experiences, have survived/thrived, and are now positioned to embark on exciting and rewarding endeavors. [y]
- Small Undergraduate Research Grants (SURG) Initiative Information and Social (U, W): This event provides an opportunity for students to learn about the rewards of an undergraduate research experience. The Undergraduate Research Director explains the grant application process. Women students who have been involved in research projects share their experiences. Fall SURG 2001 was sponsored by IBM and included two IBM researchers who were also Carnegie Mellon alumnae. [y]
- Unix Help Session (U, WM): In this help session undergraduates who are proficient with Unix help those not so skilled. Many students have expressed a need to learn from their peers in an informal atmosphere. [y]
- (Dessert) Study Breaks (U, WM): Study breaks are led by women seniors and are held during exam time. They allow students a chance to hear advice, share test anxieties and give reassurance. [f]
- Invited Speaker Series (G, WM): Speakers from academia, business, and industry are invited (individually or in groups) by graduate sub-Council members to present technical talks, share their stories and experiences, offer professional advice, promote their workplaces, offer mentoring opportunities, and discuss gender and work issues. [f]
- Advice on Graduate School and Reading Graduate School Applications (U, G, WM): In the first event, graduate students talk candidly to undergraduates about their decisions to go to graduate school, the application process, and their future plans. In the second, graduate sub-Council members read and give feedback to undergraduates who would like help with their applications to graduate school. [y]
- Grant Proposals (G, W): Our graduate Council members have contributed ideas and feedback for several grant proposals for women in IT related projects. [y]

Conferences and Outreach
- Grace Hopper Celebration of Women in Computing 2000. (U, G, WM): Council members, along with SCS faculty and researchers, presented a panel discussion on the

Carnegie Mellon experience in increasing the participation of women in computer science. *(also see upcoming events)*.

- Expanding Your Horizons (U, G, W): For the past two years, a team of SCS students, led by graduates in the Robotics Institute, have run workshops entitled "Is There A Robot In Your Future?" for middle school girls at the local *Expanding Your Horizons* conference. *EYH* is a nationally held one-day event aimed at increasing young women's interest in science and mathematics. [y]
- Girls, Technology, and Education Forum 2001 (U, G, WM): The Advisory Council presented an afternoon forum focusing on girls and technology in education and entertainment. The event successfully brought together more than 160 teachers, academics, students, and members of the business community for a full afternoon of talks and brainstorming. Together, the group discussed topics ranging from girl-friendly classroom strategies, to software game development and beyond. As an added benefit, Council members were provided an opportunity to practice their public presentation skills, their teamwork, their organizing abilities, and most importantly, to share their expertise and perspectives. This event was funded, and jointly arranged, by the SCS External Relations Office. [o]
- The Richard Tapia Celebration of Diversity in Computing, Houston, Texas (U, WM): A group of five undergraduate Council members attended the first in a series of events designed to celebrate the technical contributions and career interests of diverse people in computing fields. [o]
- PBS filming of Women@SCS (U, G, WM): Bonnie Erbe, producer of "To The Contrary," a PBS news program on women's issues, came to campus with her crew to film and interview SCS faculty and Advisory Council members. Excerpts of the program can be viewed on our web site. The show provoked a lively debate among our Council members and faculty, demonstrating that while we may share many common goals, we also hold a wide range of perspectives on gender and computing issues. [o]

Social Activities
- Graduate/Undergraduate Socials (U, G, W): Each semester graduate and undergraduate students meet informally over dinner. We have found that many more undergraduates than graduates tend to participate, but the events are generally well attended—over 70 at the last social. [s]
- Faculty/Student Dinners (U, G, W): These dinners provide a chance for students to meet faculty in a relaxed, non-judgmental atmosphere, and to increase the visibility of successful women computer scientists. We have found that a core group of faculty show up regularly and are very supportive. [s]
- Graduate Women's Welcome Potluck (G, W): Graduates try to have at least one organized social (Summer Get-together) over the summer while the Potluck 'officially' starts off the new academic year. It provides an opportunity for graduate students and faculty to get together, share

home cooked food, and welcome the new graduate students and faculty. [y]
- Women's Self-Defense Event (U, G, W): Undergraduate Council members, together with SCS faculty, teach some basic self-defense moves. [y]

Other Social Events and Activities
Include ongoing *Breakfast and Coffee/Dessert Breaks* with discussions of timely topics, *Ice Skating*, a guided tour of the *"Carnegie International"* contemporary art show, an *Ice Cream Event* at the annual SCS undergraduate picnic, and an *End of Year Council Members' Picnic*.

Upcoming Events and Activities
Include a panel presentation at *Grace Hopper Conference 2002*, *Middle School Presentations* (middle school visits to increase the visibility of women in computer science), an *International Student Event*, a *Graduate Retreat* and an *All SCS Diversity Celebration*.

4. In Closing
Our goal has been to foster a supportive community that promotes academic success and professional growth, one that will benefit women in computer science as well as the community-at-large. We endeavor to view problems as challenges to be tackled in creative and constructive ways. An active *Women@SCS* Advisory Council has enabled us to offer many events and activities to improve the academic and social climate for women in computer science. With good organization, faculty and administrative support and commitment, a student organization with an *Advisory Council* at the helm, will provide the talent, energy and innovative ideas to lead the way!

References
[1] Fisher A. and Margolis J. "Women in Computer Sciences: Closing the Gender Gap in Higher Education." <http://www.cs.cmu.edu/~gendergap/>_

[2] Fisher, A. and Margolis, J., "Unlocking the Clubhouse: The Carnegie Mellon Experience", *inroads (the SIGCSE Bulletin)*, vol. 34, no. 2, 2002.

[3] Blum, L. "Women in Computer Science: The Carnegie Mellon Experience," to appear in *The Innovative University*, Daniel P. Resnick and Dana S. Scott, Eds., Carnegie Mellon University Press, Pittsburgh, 2002. <http://www.cs.cmu.edu/~lblum/women_in_computer_science.pdf> (2.5 mb)

[4] Blum L. "Transforming the Culture of Computing at Carnegie Mellon," *Computing Research News*, vol. 13, No. 5, November, 2001, p.2. <http://www.cra.org/CRN/issues/0105.pdf>

[5] Cuny, J. and Aspray, W., "Recruitment and Retention of Women Graduate Students in Computer Science and Engineering." *inroads (the SIGCSE Bulletin)*, vol. 34, no. 2, 2002.

[6] Fox, M. F. "Organizational Environments and Doctoral Degrees Awarded to Women in Science and Engineering Departments," *Women's Studies Quarterly*, 28 (1 & 2), 47-51, 2000. <http://www.rit.edu/~wsqwww/Contents/current0012.htm>

[7] "Women Compute: Carnegie Mellon's recruiting of females in

computer science adds up to change," front page, *Pittsburgh Post Gazette*, Wednesday, April 18, 2001. <http://www.post-gazette.com/regionstate/20010418cmu2.asp>

[8] Blum, L. "Women in Algebraic Geometry Workshop at MSRI," *Notices of the American Mathematical Society*, September 1993, pp. 960-962

[9] Childress Townsend, G., "People Who Make a Difference: Mentors and Role Models", *inroads (the SIGCSE Bulletin)*, vol. 34, no. 2, 2002.

Endnotes

(1) Throughout this article "computer science" is used as an umbrella term for the range of computer sciences and related IT fields such as robotics, human computer interaction, etc.

(2) SCS comprises seven departments: The Center for Automated Learning and Discovery (CALD); the Computer Science Department (CSD) which houses the undergraduate program; the Entertainment Technology Center (ETC); the Human-Computer Interaction Institute (HCII); the Institute for Software Research, International (ISRI); the Language Technologies Institute (LTI); and the Robotics Institute (RI).

(3) J. McGrath Cohoon stresses the importance of institutional support in "Toward Improving Female Retention in the Computer Science Major," *Communications of the ACM*, May 2000.

(4) At Carnegie Mellon, students enter the computer science major as freshman.

(5) Occasionally undergraduate and graduate student ideas seem incompatible. A polarized discussion emerged as the Council set about designing a *Women@SCS* T-shirt and new logo for the web site. The more mature graduate students tended to have a feminist consciousness that affected how they want to be defined/identified. The younger undergraduates tended to see the T-shirt project as a search for a "pretty" fashion statement, and also preferred a "feminine" design for the logo. The T-shirt disagreement was resolved by allowing the undergraduates their choice, modified by input from female faculty. T-shirts were given out to SCS students in exchange for donated, decent items of clothing for the local women's shelter. Surprisingly, the T-shirts proved to be very popular and the project was very successful. The more permanent, public web site image was left open to further debate. We are, after all, an evolving community

(6) Key to Symbols
U = Undergraduates
G = Graduates
W = open to Women only
WM = open to both Women and Men
y = Once a year (or will be)
s = Once a semester
m = Monthly
f = frequently (between m and s)
o = one time event (so far)

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The SIGCSE Doctoral Consortium is an annual event held in conjunction with the SIGCSE Technical Symposium each spring. It is designed primarily for Ph.D. students in computing-related areas who are planning a career in academia. Students whose research focus is related to CS education are a primary focus, although doctoral students in any computing-related area are welcome to apply.

<http://www.csis.gvsu.edu/sigcse2003/>