# Panel Discussion on Regional Programs to Increase Participation of Women and Underrepresented Minorities in Computing: Experiences, Partnerships, and Lessons Learned

**Prof. Laura K. Dillon, Michigan State University**

Laura Dillon is an Emeritus Professor and past Chair of Computer Science at Michigan State University (MSU); before MSU, she was a professor at the University of California, Santa Barbara. Her research centers on formal methods in software engineering. An ACM Distinguished Scientist, Laura has served on numerous editorial boards, program committees, funding panels, and advisory committees—most recently, as Vice Chair of ACM SIGSOFT and General Chair of the 38th International Conference on Software Engineering. Laura was a founding adviser of MSU Women in Computing; a founding organizer of the Michigan Affiliate NCWIT Aspirations in Computing Award; and a founding organizer of the Michigan Celebrations of Women in Computing and General Chair of the first one. Laura co-led TechKobwa, a technology camp for secondary-school teachers and female students in Rwanda, for three summers. She was awarded the ACM SIGSOFT Distinguished Service Award in 2017.

**Prof. Maureen Doyle, Northern Kentucky University**

Maureen Doyle is a Professor of Computer Science and Chair of the Computer Science department at Northern Kentucky University. Dr. Doyle founded TRIWIC, an ACM regional conference for Women in Computing and chaired it in 2011, 2014, 2016 and 2018. She has also served as a 4-year college liaison to KYCC-WIC for the past 4 offerings, the first community college women in computing conference. She has served as a program co-chair for the Grace Hopper Celebration of Women in Computing. Dr. Doyle has been involved additional local program in greater Cincinnati, has served the Academic Alliance co-chair for NCWIT and most recently was awarded a NCWIT Extension Services NEXT award to support structural change at her home university.

**Prof. Linda Ott, Michigan Technological University**

Dr. Linda M. Ott received her Ph.D. in computer science from Purdue University in 1978. She joined Michigan Tech's faculty shortly after completing her doctorate and chaired the department of computer science from 1996 to 2010. Her research interests are in software engineering, including software processes, software measurement, and software engineering education. She also has interests in ethical and social aspects of computing and has been active in efforts to increase the number of women in computing for many years. She has been a co-PI on nearly $1.5 million in grants from industry and the National Science Foundation. Dr. Ott is a 2010 recipient of the ACM SIGSOFT Retrospective Paper Award for the paper "The Program Dependence Graph in a Software Development Environment," co-authored with Dr. Karl Ottenstein. The paper was published in SDE 1, Proceedings of the First ACM SIGSOFT/SIGPLAN Symposium on Practical Software Development Environments, April 23-25, 1984. In addition to teaching at Michigan Tech, Dr. Ott taught advanced software engineering at Siberian State Aerospace University in Krasnoyarsk, Russia as a Fulbright scholar. She also taught Ethical and Social Aspects of Computing at Beijing Normal University, Zhuhai in Zhuhai, China. Dr. Ott is currently Michigan Tech's lead person in the efforts to increase the number of female undergraduates in computing as a member of NCWIT's Pacesetters program.

**Prof. Wendy Powley**
**Dr. Andrea E Johnson, Spelman College**

Research is to see what everybody else has seen, and to think what nobody else has thought. ˜Albert Szent-Gyorgyi

After being introduced to computers and programming at a young age, my innate talent became a passion for understanding how people engaged with computing and how I could help improve that experience. As a researcher, I have gotten much joy from seeing people experience technology and innovation. Through

my experience in graduate school and at Intel, I've learned I have the power to bring that joy to others through user experience design and rapid prototyping. By always pushing to ask the hard "why" questions and thinking about consumers' needs and goals, I strive to ensure products and experiences we create, positively impact people's' lives.

My educational background includes a BS in Computer and Information Sciences from Spelman College, a MS in Computer Science and Software Engineering from Auburn University and a Doctorate in Human-Centered Computing from Clemson University. When I'm not working, I enjoy spending time with my family and volunteering. I love participating in STEM outreach activities as a way to expose students' to STEM opportunities and mentor them as they embrace new computing challenges.

# Panel discussion on
# Regional Programs to Increase Participation of Women and Underrepresented Minorities in Computing: Experiences, Partnerships, and Lessons Learned

## 1. Introduction

Several high-profile national programs aim to increase diversity of the computing and information technology workforce. Among them, the Grace Hopper Celebration of Women in Computing, now "the world's largest gathering of women technologists," is the best known [1]. By bringing attendees together to celebrate the accomplishments of leading women in computing and technology fields, the Grace Hopper Celebration (GHC) helps counter many obstacles women encounter along their career paths, such as lack of role models, stereotype threat, and feelings of isolation, which can undermine their confidence and engender a fixed mindset [2][3]. Such gatherings inspire women that they can be successful in pursing satisfying careers in a traditionally male-dominated field [4]. They boost women's confidence, help them build networks of peers and mentors to help them navigate difficult situations, and encourage them to assume leadership roles in changing the face of computing and creating transformative technologies [5][6]. Although not as well known as GHC, the ACM Richard Tapia Celebration of Diversity in Computing (often just called "Tapia") serves similar goals as GHC but for all underrepresented minorities in computing regardless of gender.[1] Tapia highlights the critical role that diversity plays in computing innovation, celebrates the technical contributions of diverse people in a broad range of computing fields, and provides a supportive environment for those from underrepresented groups along a variety of dimensions (racial, ethnic, gender, disability, interest, etc.) [7][8].

In contrast, effective regional programs are less well known. Programs involving a half-dozen or more institutions and targeting narrower geographical regions can often be more cost effective than national ones, especially in engaging marginalized populations. This paper stems from a panel in which four academic leaders discuss their experiences organizing and participating in regional programs to increase participation of women and underrepresented minorities in computing. The authors have all contributed to multiple regional activities—one, first as a mentee, and then as a mentor in a STEM program for minorities; and four as organizers of regional ACM Celebrations [9] and Aspirations in Computing Affiliates of NCWIT [10]. The paper reports their responses to questions about goals, costs and benefits, building partnerships, lessons learned, and the impact of their participation in these programs on their careers. Readers will come away with ideas for programs that may be effective in their regional contexts and pointers to resources and information for building the partnerships needed to undertake them.

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[1] African Americans, Hispanics, Native Americans and indigenous peoples, and persons with disabilities

## 2. Background

### 2.1 Computing's Diversity Scorecard

Computing is a high growth field with well-paying career opportunities, but the percentage of women and minorities in careers in computing is well below their percentages in both the workforce and in society. With a 19% projected job growth in computing between 2016 and 2026, employment prospects and compensation levels in computing are both excellent; the pay gap between men and women is also low compared to other engineering disciplines.[2] Yet over the past decade, women have held only 25% of computer and mathematical (C&M) jobs while comprising 56%-58% of the total workforce [11]; in 2016, Blacks made up only 7.9% percent of C&M workers while comprising 11.9% of all workers; and Hispanics made up only 6.8% of C&M workers while comprising 16.7% of all workers [12].

Interestingly, computer science initially attracted a high percentage of women for a STEM field. But 1984-85 marked the high point with women accounting for 37% of students earning BS degrees in computer science (Figure 1). The percentage began to drop the following year and reached a low of 16% in 2011-13. A slight uptick occurred starting around 2011 to about 19% in 2017-18.
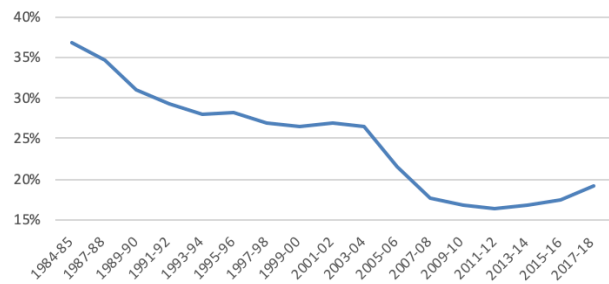


*Figure 1. % of CIS BS degrees earned by women 1984-2018*

The lack of racial and ethnic diversity in undergraduate degree programs in computer science is even more pronounced (Figure 2). In fact, the numbers for American Indians and other indigenous groups are too small for trends to even be discernable.
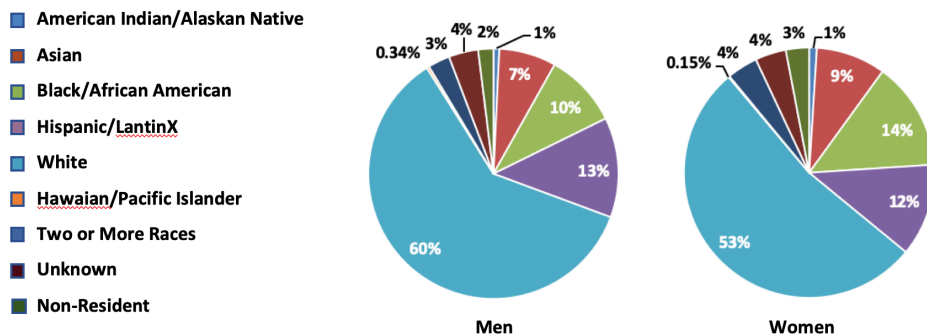


*Figure 2. Racial and ethnic composition of CIS BS degrees by gender, 2017*

These data signal more than just lost opportunity for women and minorities and for labor to fill workforce needs; more importantly, they signal loss of potential contributions to technological innovation. Studies show that teams with greater diversity are more productive and creative, demonstrate superior "team dynamics," and deliver results in less time and at lower costs than homogeneous teams [13]. A field as important as computing cannot afford to miss out on the creativity and perspectives of 70% of the population [14] [15] [16].

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[2] a median salary in 2018 of $79,223 for women and $82,159 for men

## 2.2 The Grace Hopper Conference

AnitaB.org [17] offered the first Grace Hopper Celebration (GHC) in 1994, a handful in the next 10 years, and every year since 2006. A graphic from the *GHC 15 Impact Report* [18] (Figure 3) shows explosive growth in attendance numbers starting around 2009 until 2015; and this trend has continued, with GHC 19 attracting nearly 25K attendees [19].

Prior to 2015, GHC was held in different cities in the United States and, once, in Canada. But by 2015 GHC had become too large to fit in more than a select number of metropolitan areas with large conference centers. GHC has therefore been held in either



*Figure 3. Attendance at GHC from 1994 to 2015*

Houston, TX or Orlando, FL ever since. This has contributed significantly to travel costs for students from Canada and the northern and western areas of the United States. Registration fees for students have also increased as GHC has grown. Student registration for the last two years was $450 (a 29% increase over the year before).

GHC actively promotes diversity along many dimensions—nationality, ethnicity, sexual identity, ability, stage of career, tech sector, company/institution type, etc.—offering wide-ranging technical and social sessions, and scholarships for women students, women of color, women at minority serving institutions, and technical women who pursue non-traditional career paths [19]. This diversity is inspirational, but also makes for an extremely large program. Students can find the program particularly difficult to navigate as much of it is intended for a more senior audience (workforce). Congestion impedes timely movement between sessions, especially for attendees with physical disabilities, and popular sessions fill quickly. Additionally, as the attendance numbers have exploded, the percentages of students and faculty attending has declined, decreasing the likelihood of students and faculty from different institutions connecting with one another. GHC hosts a multi-day career fair for sponsors to meet and recruit attendees; in 2018, over 400 organizations participated in the GHC career fair [20].

In spite of problems due to scale, survey responses from attendees indicate the conference has the intended impact on students who are able to attend. In 2019, for example, 83% of student respondents reported feeling part of a larger community of technical women after the conference and 80% said they knew more about careers in computing because of attending. Additionally, in a survey of some 80 alumnae of partner programs[3] that engage diverse high school students in tech, 97% responded that attending GHC 19 increased their interest in careers in tech and 94% responded that attending GHC 19 increased their feelings of belonging to the field of computing [19]. These responses are consistent with findings of a study of first-year students at Harvey Mudd College (HMC): Going to GHC had a strong positive affect, not just on students who intended to major in computer science, but also on those who had no intention of doing so and no
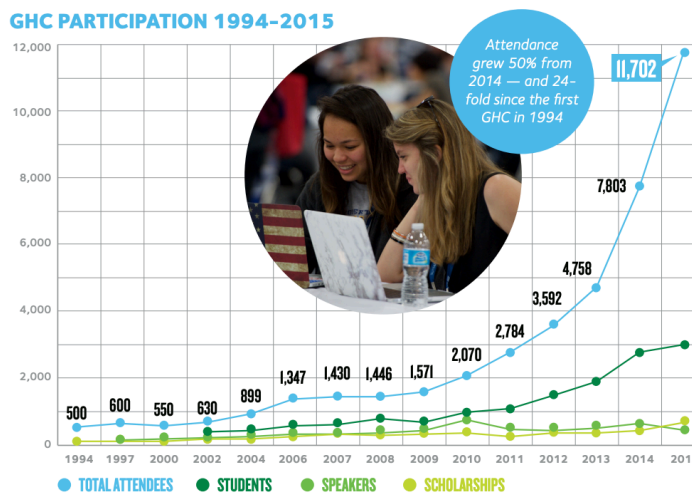
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[3] Specifically, Black Girls Code, Girls Who Code, Code as a Second Language, Aspirations in Computing, and SMASH.

experience with computing prior to attending. Many in this latter group chose to major in computer science in their sophomore years [21].

## 2.3 The Tapia Conference

The first Tapia Celebration of Diversity in Computing was held in odd years starting in 2001 until 2013 and has been held yearly since 2014. Initially a project of the Coalition to Diversify Computing (CDC) [22], it was sponsored jointly by ACM and IEEE-CS in cooperation with CRA. Since 2014 it has been hosted by the Center for Minorities and People with Disabilities in Information Technology (CMD-IT)[4] [23]. The first 11 Tapia Conferences have been located in 9 US cities, all with large populations of people from groups underrepresented in computing.[5] Attendance at Tapia has increased from 164 in 2001 to almost 1.5K in 2018 and 1.9K in 2019 [24].

Tapia promotes diversity along many of the same dimensions as GHC (Figure 4[6]). But students and faculty make up a much more significant proportion of attendees at Tapia than at GHC (Attendees, Figure 4). The percentage of women at Tapia mirrors that of the general population and significantly exceeds their percentage among CS majors and C&M workers (Gender Diversity, Figure 4). The percentages of attendees who are Black and who are Hispanic also significantly



*Figure 4. Tapia attendee demographics (2014-2018 averages)*

exceed their respective percentages among CS majors and C&M workers, but is well below their percentages in the general population (Ethnic and Disability Diversity, Figure 4).
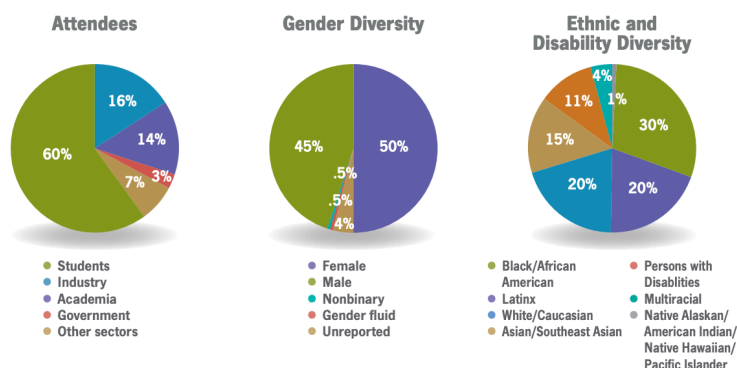
The Tapia program is designed primarily for an academic audience, with an emphasis on sessions for students. But the Tapia career fair also attracts sponsors from industry, academia, and national labs—Tapia 2018 set a record with 134 sponsoring organizations [25]. While the conference has grown to a size that is no longer "intimate," it is not so large that attendees with similar interests and backgrounds or at similar stages in their careers have difficulty connecting. The location moves regularly, increasing the chance that it might be located relatively nearby in some year during a student's time as an undergraduate student. But the cost for a student to attend Tapia is high. In 2020, the student registration fee alone will be $500.

Responses to post surveys show that Tapia is at least as effective as GHC in achieving its goals for students. Students consistently report being inspired to complete degrees in computing at rates of over 80%, and of having made new connections and learned about new opportunities in computing at rates of over 90% [24].

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[4] The CDC merged with the CMD-IT in 2016.
[5] Two cities have hosted Tapia twice—Atlanta (2003, 2017) and Orlando (2007, 2018); Houston, the location of Tapia 2001, will host it for the second time in 2020.
[6] Charts in this figure are from the Tapia 2019 Academic Plan II Benefits Brochure [34].

## 2.4 ACM Celebrations

The ACM-W Regional Celebrations (later rebranded as ACM Celebrations) were the brainchild of Dr. Gloria Childress Townsend. She envisioned that affordable gatherings of women in close proximity could provide similar benefits as GHC for students and faculty who were not able to attend GHC because of cost or responsibilities that prevent them being away for nearly a week [26]. She organized the first regional celebration in Indiana in 2004 hosting 100 attendees at a lodge in the country [27]. Over the next 5 years, supported by a US NSF grant, regional celebrations spread to Ohio, Michigan, Minnesota, Kentucky, New Mexico, Colorado, New York and the Carolinas. The first international ACM Celebration took place in Canada in 2010. From 2012 onward, international participation increased with ACM Celebrations being held in India, Philippines, New Zealand, Russia, and many European countries. The peak year was 2016/2017 when 26 ACM Celebrations reached more than 5000 attendees. Since then, the number of ACM Celebrations has declined slightly, we think due to volunteer fatigue.

On average, ACM Celebrations host between 150 and 250 attendees, with the vast majority of participants being students; they usually last between 1 to 1.5 days and include an evening of activities and an overnight stay. An ACM Celebration will often have a dozen or so corporate and academic sponsors who pay a fee to participate in a small career fair. Organizers use these funds to subsidize student participation, with average registration fees of around $50 including a night of lodging and all meals. Many colleges and universities cover the registration fee for their students so the students can attend at no cost. A study comparing outcomes from the 10 ACM Celebrations held in 2011/2012 with those of GHC 2011 support that the regional celebrations offer an effective alternative to GHC [28]. Student responses on post surveys to the same questions from the different events were compared. On questions about impact of the meeting on feelings of belonging, confidence, resolve to complete a computing major, feeling inspired, knowledge of opportunities in computing, and expanding their network of technical women, the percentage of favorable ratings for the surveyed ACM Celebrations was at least as high or higher than those for GHC 2011. Moreover, 50% of the student respondents who attended an ACM Celebration reported never having attended a technical conference, and 20% reported being first-generation college students.

## 3. Method

In preparation for the panel, the four panelists were asked to provide individual responses to the following five items via email:

a. Describe a regional BPC[7] program you feel was particularly effective in engaging students who typically do not attend larger, national programs.

b. What partners have worked with you in organizing successful regional BPC programs?

c. What model has worked to fund regional BPC programs you have been involved with?

d. What lessons would you like to share about how to increase the likelihood that a regional BPC program is both effective and sustainable?

e. How has your participation organizing regional BPC programs impacted your own career? Would you recommend it to others?

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[7] Broadening Participation in Computing

The panelists chose to describe Beam Village (BV, Johnson), the Michigan Celebration of Women in Computing (MICWIC, Ott), the Tri-State Women in Computing Conference (TRIWIC, Doyle), and the Canadian Celebration of Women in Computing (CAN-CWIC, Powley). This article contains the panelists' responses to these questions. For brevity, we refer to the programs using the acronyms shown in parentheses.

## 4. Results

### 4.1. *Describe a regional BPC program you feel was particularly effective in engaging students who typically do not attend larger, national programs.*

**BV**: Beam Village is a collective of Black educators and service providers that supports minority students in Portland, OR and surrounding areas to break generational cycles of socioeconomic suppression [29]. It encompasses a variety of community-driven educational programs, which include exposing students who traditionally lack opportunity to computing and engineering experiences, leadership training, and personal and professional development activities.

The founder of Beam Village recognized that gaps in the services and resources colleges offer their students prevent students from pursuing careers that could change their future trajectories. Students spend inordinate amounts of time in college to learn skills that do not align with those they need to establish promising careers.

Beam Village supports students from middle school through post-secondary school. Workshops inform them about challenges that affect traditionally underrepresented minority students. Discussions include financial challenges and ways to overcome them, studying and maintaining academic excellence, preparing for their next academic step (middle, high school, undergraduates), building confidence, working through the imposter syndrome, and many other important topics.

Other enrichment activities include job shadowing and a day-long Student Success Summit. Students learn about and contribute to projects that involve hardware and software engineers, software developers, designers, researchers, and other professionals. The Success Summit also hosts a career and college fair during which students meet representatives from companies and schools that many of them are unfamiliar with. They ask questions of company representatives and learn best practices for success in landing offers and thriving in their workplaces.

The success of Beam Village is evident in the large numbers that enroll in college, often pursuing non-traditional majors, which they previously thought they would not like or could not master. They build ongoing relationships with mentors, land scholarships, and attend conferences that they never would have been aware of if not for the Beam Village exposure.

**MICWIC**: The Michigan Celebration of Women in Computing (MICWIC) has been held biennially in Michigan since 2007.  The location of MICWIC moves across the southern (most populous) region of Michigan to encourage participation from students across the state. It is typically hosted at a local university. From 70-80% of attendees are college or university students in computing degree programs. Other attendees include educators, representatives from industry, and a few individual practitioners and high school students.  Much of the program is aimed at the students.  Keynote speakers are chosen to be both inspiring and serve as role models. Some sessions focus on career preparation and provide resume feedback, develop interview skills, and encourage networking.  Other sessions focus on increasing students' awareness of research opportunities and the breadth of the field and aim to encourage

undergraduate students and industry professionals to consider graduate school. MICWIC provides opportunities for students to present posters and papers in a supportive environment and gives professional-development scholarships to top student presenters in several categories. The MICWIC program also includes sessions of interest to non-student attendees, with discussions on such topics as curriculum issues, outreach, and confronting bias.

Surveys of MICWIC attendees indicate that MICWIC is many students' first time attending an event consisting mostly of technical women—66% of students who responded to MICWIC'19 post surveys reported not ever having attended any other conference, let alone one on BPC; only 19% reported ever attending GHC. Post surveys also support that MICWIC is one of the more supportive technical environments that students encounter. Respondents report being inspired to continue in computing and pursue technical careers. They talk about opportunities in the field that they are newly aware of and excited by.

Students find attending MICWIC much easier than attending a large national conference. First, MICWIC is closer to home so there is less fear of the unknown. Second, it is financially much less costly. Even for the few students with scholarships to GHC, incidental expenses on a trip to Houston or Orlando can be a financial burden; and expenses for Michigan students without scholarships typically run around $1,500. In contrast, the $25 student-registration fee for MICWIC covers meals and a night lodging, with travel costs for most students being negligible. Third, and perhaps most significant for many students, is the relative cost in time. MICWIC starts late afternoon on a Friday and ends the next Saturday. Even students in Michigan's Keweenaw Peninsula, with an 8-hour drive to attend, can leave late on Thursday and be back by noon on Sunday. They miss only Friday classes and have time on Sunday to catch-up on homework. Attending GHC is a 5-day commitment; it requires missing 4 days of classes and losing sleep to stay on top of assignments. Many students feel they simply cannot afford to take that much time away from their classwork.

**TRIWIC**: The Tri-State Women in Computing Conference (TRIWIC) has been held in the greater Cincinnati area and Kentucky roughly every other year since 2011. TRIWIC 2018 brought together more than 200 faculty and students from 17 different colleges and universities. Forty-five students attended from Northern Kentucky University (NKU) alone, which far exceeds the 5-10 NKU students who travel to national conferences each year. TRIWIC encourages student participation by offering a scholarship for all student attendees, which keeps attendance costs to $25 or less. In addition, many schools pay the nominal fee so students can attend at no cost. From a student-impact perspective, sending 45 students to TRIWIC costs NKU only $1125, which is about the cost of sending one student to Grace Hopper or another national conference.

We intentionally developed a system so obtaining a scholarship is easy. Students write a paragraph explaining why they want to attend. Committee members review applications to ensure they are legitimate. To date, all students who applied for scholarships have been awarded them. The registration fee is all inclusive, and includes meals, hotel for one night and a t-shirt.

Evaluations show the most popular event has been Speed Mentoring. Students also praised two other sessions highly: a salary negotiation session and a session discussing the history of women in technology. Two other salient findings are that many students said they had not realized how isolated they were and that they valued being with a large group of women.

**CAN-CWIC**: The Canadian Celebration of Women in Computing (CAN-CWIC) [30] is a Canada-wide ACM Celebration. Canadian students, faculty and professionals meet to network, celebrate, learn and bond to create community. The conference began in 2010 and ran for five years as the Ontario Celebration of Women in Computing (ONCWIC) (targeted to students in the province of Ontario) before transitioning to a Canada-wide event in 2016. In addition to the five Ontario-based Celebrations, ACM Celebrations were organized in the Atlantic Region (New Brunswick) in 2011 and in the Pacific Region (Vancouver) in 2012. The two coastal celebrations ran only once each due to the lack of a champion to sustain them. The current Canada-wide celebration alternates between a central location (Ontario or Quebec) and the East or West coast each year, giving those in different regions of Canada a chance to attend every few years.

Attendance at CAN-CWIC grew from 150 in 2010 to around 300 in 2014. In 2016, on transitioning to a national event, the conference attracted close to 500 attendees. In 2019, it drew over 700 attendees across 9 provinces. According to our survey, more than 50% of attendees had never attended a conference of any kind and only a few had attended Grace Hopper.

The benefits to all attendees are vast and varied. For students, the chance to meet other students from across Canada can make them feel less isolated, supported, and encouraged to continue their studies. After attending the conference, many of the women have started women's groups at their universities, thus growing the support network. Many students obtain internships or full-time employment in Canadian-based companies by contacts made at CAN-CWIC's career fair.

Students meet professional women from a variety of sectors – software companies, financial institutions, engineering firms, educational institutions etc. They report that hearing from women in the field allows them to see themselves in a similar role. The poster session gives students an opportunity to share their ideas with others and, for many, an opportunity to present their work for the first time. The conference introduces students to professional organizations such as ACM, NCWIT and CS-CAN/INFO-CAN, organizations that they may join, contribute to, and benefit from in the future.

Each year CAN-CWIC holds a faculty meeting for female faculty from across Canada. Faculty get to know one another and discuss common issues and concerns. These meetings have led to partnerships and initiatives such as building a tool to track enrollments and research in CS departments across Canada. Our "Inclusive Teaching" workshop is a chance for faculty to meet and mingle with high school teachers and to share and learn new ideas for ensuring that classrooms at all levels are inclusive to everyone.

Professionals attending CAN-CWIC serve as role models, encouraging and mentoring more junior women, and also meet professionals from other companies. They have the chance to recruit potential hires and conduct interviews at the conference. Many of the professionals give talks and run workshops; they are also invited to attend any of the sessions of interest.

One benefit of CAN-CWIC for companies that have offices in Canada is that they have the opportunity to recruit Canadian talent. Some schools used to send students to GHC only to have them hired by companies in Silicon Valley. Encouraging Canadian students to attend GHC was contributing to brain drain. Many of the schools who were sending students to GHC are now sending students to CAN-CWIC instead.

The cost for students to attend CAN-CWIC is $125 CND, which includes the conference, 3 meals, shared overnight accommodation in a hotel and, for those within driving distance, bus

transportation to the conference. The total budget for the conference in 2019 was approximately $180K CND.

**4.2** *What partners have worked with you in organizing successful regional BPC programs?*

**BV**: After my first experience volunteering as a speaker at the Student Success Summit, I saw the potential and power that the Summit could have on the Portland community. I immediately signed up to assist the planning committee for the next year. My employer at that time, the Intel Corporation, encouraged volunteerism. Through our Beam Village partnership, we were invited to host a series of demos and workshops based on a Day in the Life experiences of Intel Employees. We were able to solicit the aid of at least 20 employees. The planning committee was about 10 employees strong. We created separate committees to focus on the logistics of the location, soliciting volunteers, and curating the demos and workshops. We leveraged existing relationships with Beam Village and solicited help from the Portland State University student body, small schools in the area and community volunteers. Volunteers divided themselves based on skills and interests and many of the Intel employees offered to bring different technologies and demos from their work at Intel.

Beam Village benefits from numerous growing partnerships between local industry, education, and entrepreneurs. Companies like Intel, Nike, Kaiser Permanente, Oregon Department of Transportation, and others, support employee resource groups and sponsorships that strengthen the possibilities of this initiative.

**MICWIC**: We have worked with faculty at a dozen universities and colleges across the state of Michigan. In addition, alumni from our departments, past MICWIC attendees, and representatives from industry have joined our committees. Some industry representatives participate because they have recruiting roles in their organizations. Others are interested in broadening participation in the industry. Past MICWIC attendees want to give back to the community that nurtured them.

**TRIWIC**: Most of our organizing partners have been academic, with occasional industry partners. We have created outstanding partnerships with female faculty from many of the universities in the area and, perhaps more importantly, with faculty from community colleges. The partnerships with other university faculty focus primarily on the conference. But the partnerships with community college faculty have included their own regional BPC conference (KYCC-WiC) and other broadening participation activities.

We solicit volunteers for organizing TRIWIC from the set of previous TRIWIC attendees. We engage all who are interested in helping, and have had volunteers from start-ups, General Electric, and other local Cincinnati companies. That said, a core group of four women in academia are always engaged deeply with TRIWIC; they are joined each year by different volunteers depending on volunteers' availability.

The organizational structure varies depending on the conference chair. Some years we have multiple sub-committees (e.g., logistics, program, registration); other years we have only the conference committee and program sub-committee.

**CAN-CWIC**: CAN-CWIC is an ACM Celebration in partnership with CS-CAN/INFO-CAN (a professional organization for Computer Scientists within Canada). ACM has supported the conference since its inception, providing valuable guidance, support and financial assistance in

organizing the event.   CS-CAN/INFO-CAN will be taking on a significant portion of the conference organization in 2020.

### 4.3 *What model has worked to fund regional BPC programs you have been involved with?*

**BV**: My involvement in Beam Village was supported by my employer at the time. The Intel Involved Program allowed employees to find volunteer opportunities that matched their skillsets and interests [31]. Along with volunteering their time, for each hour an employee spent volunteering, Intel donated ten dollars ($10) to the organization. Through programs like these, many companies have established and made clear their commitment to serving and partnering within their surrounding communities.

**MICWIC**: We have both academic and industry sponsors, and also receive support from ACM and the CRA. Academic sponsors support MICWIC because of the opportunities it provides their students and to demonstrate their support for diversity.  Industry sponsors are typically interested in recruiting students from participating universities, especially women and underrepresented minority students. A tiered level of sponsorship provides them with varying amounts of exposure to the students, as well as opportunities to interview students during a Career Fair on the Saturday afternoon of MICWIC. In addition, ACM also provides critical financial management services and hosts the MICWIC website. Finally, we have leveraged the CRA Distinguished Speakers Program to cover speaker travel expenses.

Over the years we have built up a small reserve fund. When the demand for computing graduates is high, fund-raising is relatively easy. When the job market is tighter, fund-raising is more difficult. The reserve helped us through an early lean period. It has also provided funds for expenses incurred before financial support for the upcoming MICWIC started coming in.

**TRIWIC**: The cost of the conference has varied between $15K, when held at a state park in Kentucky, to $40K, when held on a college campus hotel in Greater Cincinnati. TRIWIC 2011 was supported by NSF funding from Gloria Townsend's Regional Celebrations grant.  We have been fortunate that the ACM and Microsoft or NCWIT have donated $6K for each conference, and we have received funding from CRA-WP [32] (previously CRA-W) to bring national speakers to the conference. Unfortunately, the CRA-WP program providing speakers is no longer available.  All other fundraising came from area businesses and universities.

Our fundraising plan is straightforward: We release a call for donations. While this plan has worked out fine, it can be stressful. TRIWIC 2018, our most expensive conference to date at almost $40K, created 6 months of stress for the chair, resulting in the loss of a consistent academic volunteer.  There was only $67 left in the TRIWIC account after paying all of the bills. As a result of this experience, TRIWIC 2020 is being held at a much less expensive venue.

**CAN-CWIC**: CAN-CWIC is supported by corporate sponsorship on a year to year basis. Many of our companies have supported the conference for all nine years. However, as the conference has gained traction, more companies have come on board each year. The challenge with this model is that we do not know our total intake until very close to the conference date, making planning difficult. As the conference has grown, we have outgrown less costly venues, increasing the overall cost of the conference significantly.

Tech companies have realized that hiring diverse talent benefits the company, and the lure of 500 potential hires is very attractive to recruiting teams. A resume database is compiled each year and is of great interest to our sponsoring companies. It appears that the companies recognize the

importance of this event and are willing to support it. The cost for sponsorship ranges from $1000 (academic institutions) to $25,000 (partnership). Each level garners a different set of benefits. Top-level sponsors are guaranteed speaking opportunities.

We have partnered with NCWIT to provide the Aspirations in Computing Awards as of 2019. Shopify was the sponsor of the Aspirations Awards for 2019-2020. They were interested in this program as a way to introduce their Dev Degree education program to award recipients. We look forward to growing this initiative and building upon our partnership with NCWIT.

We rely on institutions to encourage students to attend. This year we offered complimentary sponsorship to all academic institutions that pledged at least $1000 to support a group of their students to attend the conference. This benefit seems to have been highly motivating as thirteen schools took advantage of the offer.

### 4.4 *What lessons would you like to share about how to increase the likelihood that a regional BPC program is both effective and sustainable?*

**BV**: I have three main lessons to impart. First, identify who you are attempting to serve and coordinate with them to understand their needs. Plans for many initiatives are based on inaccurate assumptions of a community's needs, which can be dangerous and denigrate the intended effect. The perception of a "savior mentality" can cause resentment and decrease interest in community participation.

Second, identify partners seeking mutually beneficial relationships. By growing and investing in your community efforts, they grow and increase their talent pool, build their company reputation, and increase the quality of their contributions as a community citizen.

Third, engage with local employers in areas that are a cultural fit for your students. Students sometimes miss the trees for the forest and can miss opportunities within their local community. The lure of Silicon Valley can overshadow opportunities that can be just as lucrative and impactful to their careers. Smaller local companies can offer benefits to students with non-traditional matriculation challenges (multigenerational families, first generation students, caring for family members with health challenges, etc.). Opportunities like co-ops and internships allow students to interface with a company and assess their fit, get experience in industry, expand their networks, and identify mentors.

**MICWIC**: I think it is vital to have some key individuals involved who truly believe in the importance of a regional BPC. But the organization cannot rely solely on a few individuals. We have a well-established committee structure. Most committees have a mix of faculty members and industry representatives. Some committees function quite well with a reasonable distribution of the workload and the knowledge. This is clearly essential for long-term viability. Unfortunately, this isn't true for all of our committees.

Individuals in key leadership roles are often already over-committed professionally. Thus, they need capable administrative support to organize a regional conference. This has been a struggle for us. Without administrative support, the jobs of the organizing committee become overwhelming.

Having a financial reserve is critically important in years when fund-raising is difficult. When companies are cutting back on recruiting expenses, students need more encouragement to persist in their degree programs and are likely feel a financial strain.

**TRIWIC**: As the previous conference chair I learned four key lesson. First, I believe TRIWIC is effective primarily because we follow the original structure defined by Gloria Townsend and included in the Regional Celebrations-In-A-Box from NCWIT [33]. Second, I have always asked a lot of folks to volunteer and then worked with whoever showed up to help. This practice has been a huge win both for the conference, because the volunteers have passion, and for me, because I have gotten to meet and work with many different people. Third, we use ACM's resources for hosting our website and for managing our funds. This arrangement has been a great win, especially when collecting donations, because most of our donors have heard of ACM. Finally, I wish we had worried more about sustainability from the start. Sustainability is still an issue. In particular, we should have set up a structure for a rotating chair. I am thrilled that we have two co-chairs for TRIWIC 2020 and hope this continues for future conferences.

**CAN-CWIC**: CAN-CWIC has been organized by different schools throughout the years, moving from one institution to another. This was a great model at the beginning when the event was small and could be organized by a small group and held in a small venue. We have now grown to a national event and at this point it is difficult to find someone who is willing to take on the organization of such a large event. The people who have organized in the past are busy academics. Although they support and look forward to the conference, the passion is not there to keep it going. We are struggling with sustainability. I have noticed this trend among many of the ACM Celebrations that have taken place over the past 10 years – the organizers are burnt out. I strongly suggest putting in place an organizational structure and having two people in each position – one experienced person and one to shadow so that they can move into the senior role the following year.

It is important to ensure that the event is accessible to all and that it is reaching those who need it the most. Providing accommodation and transportation along with the conference at a low, affordable price has been key to drawing large numbers of students. Having a champion at each institution who spreads the word and encourages students to attend increases the likelihood of students attending.

One trend we have noticed is that as student attendees join the workforce, they inform their company of the conference and encourage them to sponsor and get involved. We are seeing many of our past student attendees now attending as speakers or as recruiters. Encouraging this trend helps to sustain the conference.

**4.5** *How has your participation organizing regional BPC programs impacted your own career? Would you recommend it to others?*

**BV**: I enthusiastically encourage and recommend the organization and/or participation in BPC efforts. Our world is changing; expanding the number of diverse voices in computing ensures our society grows and develops accordingly.

My participation in BPC efforts has benefited me in many ways. It has strengthened my emotional intelligence; developed my capacity for mentoring; and increased my knowledge of resources available to students, curriculum development, and new technologies for CS education. It encouraged me to reflect on how my career might best align with my passions. I reasoned that I could have a bigger impact training the voices of the future than being a singular voice that was not reflective of a larger community. My participation in BPC efforts expanded my professional network; it gave me access to many mentors who helped facilitate my transition from industry and into academia as a tenure-track Assistant Professor.

**MICWIC**: I can see a direct connection between my participation in MICWIC on both my career and, perhaps more importantly, on my department. I began participating in MICWIC at a time when the number of female students in our Department was appallingly low and I was truthfully discouraged in my efforts to increase the diversity of our student body. Working with others across the state brought an element of enjoyment to working on what had become a "hopeless" cause.

It was also because of my role on the MICWIC organizing committee that I first attended a NCWIT Summit. Attending that first Summit exposed me to a host of programs and resources offered by NCWIT. Ultimately, our Department has participated in a number of NCWIT programs and has seen a dramatic increase in the diversity of our student body as a result.

The changes in our Department's diversity occurred at a time when our University administration was paying particular attention to the diversity of our undergraduate student body. As a technological university, our student population continues to be predominately male. I was given much of the credit for the changes in our Department's diversity by the University administration and was given a three-year term as Associate Dean for Special Initiatives in our College. This allowed me to focus more time and energy on our diversity initiatives, as well as retention initiatives in our computing degree programs.

**TRIWIC**: Organizing TRIWIC has impacted my career significantly, but it may be hard to measure. I have volunteered for more leadership opportunities as a result of running this regional conference. At NKU, I agreed to serve as an Associate Dean and Chair. I also stepped up when asked to volunteer with NCWIT, serving in various positions including a 3-year rotation as a co-chair of the Academic Alliance. Finally, I was more confident to volunteer with ACM SIGCSE. I served as ACM/SIGCSE Bulletin co-editor, am currently serving as co-chair for ACM/SIGCSE KidsCamp, and will serve as symposium co-chair for 2022 and 2023. Most, if not all, of these opportunities resulted from connections I made organizing TRIWIC. I encourage others to organize a conference! It is fulfilling in and of itself; but more than that, you get to meet many wonderful people working towards the same goals of broadening participation.

**CAN-CWIC**: I believe that organizing ONCWIC/CAN-CWIC has had a huge positive impact on my career. I used to fear that being involved in "Women in Computing" initiatives would set me apart in a negative way from my male colleagues. It has had quite an opposite effect. The conference has garnered a fair amount of publicity and my efforts have been recognized within my university by top administration. I have been invited on several occasions to speak on CBC radio on various topics related to Women in Computing and asked to give talks at numerous events. I have changed the culture of my department and the topic of diversity comes up in nearly every meeting. We now have a diversity committee of which I am Chair. I was asked to join the ACM Executive Committee. This opportunity allowed me to grow my network substantially as I attended conferences such as GHC, the NCWIT Summit, and SIGCSE in this role. My increased network led to new research collaborations and publications with new colleagues.

When I started CAN-CWIC in 2010, I was working as a Research Associate for a professor. I now hold an Assistant Professor position. I believe that my high-profile role as the founder/organizer of CAN-CWIC and my role in the ACM-W substantially boosted my profile as a leader within my department and led to my promotions.

I echo the comments of Dr. Gloria Childress who said, "organizing an ACM Celebration was the most rewarding thing I have done in my career".  I whole-heartedly agree. It has been an incredibly satisfying experience with huge impact.

## 5. Conclusions

While national gatherings that promote diversity in computing receive significant more attention than regional ones, regional ones appear to offer a number of advantages over national ones. As a whole, they reach a broader audience while still being affordable and intimate. Regional proximity of participants makes it easier for participants to stay connected between conferences and enhances interactions because of commonalities in their experiences and challenges (e.g., regional funding priorities, state-specific equal-rights laws, etc.). Corporate sponsors, especially regional ones, can expect more "bang for the buck," as the cost to sponsor is much lower and they contend with fewer sponsors for visibility. Additionally, they can recruit student interns and new employees from close-by schools, a high percentage of whom have ties to the area and do not need to relocate. The cost to organize a regional event is small in comparison to a national meeting of the size of even Tapia, let alone GHC. Excellent resources are available to support new organizers in planning and carrying out new regional events.

Given the advantages of regional events that promote diversity in computing, their potential very broad (combined) reach, and the impact that the events have on both participants' and organizers' careers, the authors highly recommend prioritizing investment in more regional programs throughout the world, especially in rural and underserved areas. Additionally, all regional programs will benefit from some support to enhance organizational sustainability, which appears to be a common problem for existing regional BPC events. While the authors report on regional diversity programs only in computing, many of the conclusions and lessons reported in this paper likely generalize to any field of engineering that lacks diversity.

## 6. Acknowledgements

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