

## Invited paper

Jodi Tims\* and Reyyan Ayfer

# ACM-W: global growth for a local impact

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**Abstract:** ACM-W is the community within the Association for Computing Machinery (ACM) that is dedicated to issues of gender equality in Computer Science. ACM-W works globally to support, celebrate and advocate for the full participation of women in all aspects of the computing field. This article presents a brief history of ACM-W with an emphasis on the global growth of the organization. A summary of the primary programs of ACM-W is provided to further highlight the global impact of our work. Also included are examples of how ACM-W is partnering with other computing and scientific organizations to realize greater impact in the arena of gender equality.

**Keywords:** Computer science; gender equity; gender gap; science; STEM; women in computing.

## Introduction

Computer Science, like other scientific fields, struggles to attract and retain women. In the United States, for example, the percentage of women graduating with bachelor's degrees in CS during the 2019-2019 academic year was 21 % at Ph.D. granting institutions [1] and 18.3 % at non-Ph.D. granting institutions [2]. In Europe, representation of women among bachelor's degree recipients in 2017–2018 was 20 % or lower in all but a few countries [3]. Furthermore, only 26 % of professional computing occupations are held by women in the U.S [4]. ACM-W is the community within the Association for Computing Machinery (ACM) whose mission is to support, celebrate and advocate for the full participation of women in all aspects of the computing field. This article a brief history of ACM-W, particularly as related to its global presence. We then highlight the projects and partnerships of ACM-W that are expanding globally and enhancing the experience of undergraduate, graduate and professional women in computing worldwide.

## ACM-W: an evolving organization

In February 1946, the first programmable electronic general purpose digital computer was announced. Scientists knew that they had created something that would change history, but they weren't sure how to convey their breakthrough to the public. One year later, in 1947, the Association for Computing Machinery was founded as the Eastern Association for Computing Machinery with a mission to advance the science, development, construction, and application of the new machinery for computing, reasoning, and other handling of information. During this era, the term "computer" was used for women who were performing advanced calculations that were pre-work to the digital computation process. Over the next three decades, computing advanced rapidly and became recognized as a legitimate scientific discipline. The moniker of computer was transferred from the women who worked in the field to the machinery itself. During this time, women were a small but growing segment of those preparing for and participating in careers in computer science. However, during the

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**Article note:** A collection of invited papers on the gender gap in science.

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**\*Corresponding author: Jodi Tims**, Northeastern University, San Francisco, CA, USA, e-mail: [jodi.tims@northeastern.edu](mailto:jodi.tims@northeastern.edu)  
**Reyyan Ayfer**, Bilkent University, Ankara, Central Anatolia, Turkey

decade of the 1980s, the percentage of computing professionals that were women began to decrease, eventually plunging into the single digits. At this point, it was recognized that there was a need to engage in work focused on increasing women's participation in the field and providing support to improve their experiences in the academy and beyond. In 1993, the ACM-W committee on women was created within ACM for this purpose.

From its beginning, the work of ACM-W has reached beyond the United States, the geographic home of the ACM organization. For the first 15 years of ACM-W's existence, the Ambassadors program had a presence in several countries including Australia, Brazil, Canada, England, Germany, Pakistan, New Zealand, South Africa, and Turkey. In 2009, ACM established regional committees in China, Europe, and India. Starting in 2014, each of the ACM regional committees launched the present-day organizations of ACM-W Europe, ACM-W India, and ACM-W China. ACM-W leadership, recognizing the positive impact on its work realized by these regional committees, formed ACM-W Asia-Pacific and ACM-W North America in 2019 and have future plans to establish committees in Africa and South America.

## ACM-W chapters: local communities of support

ACM's professional and student chapters are established worldwide to provide local communities where members can engage in learning, networking, and outreach activities with peers and experts in a variety of computing fields. The first ACM-W chapter was a student chapter chartered at the University of Wisconsin – Madison in May, 2005. Since that time, some 275 chapters have been established, 196 of which are currently active (17 professional, and 179 student). Figure 1 depicts the growth trajectory of the chapters project for the past eight years and captures the rapid growth that occurred between 2014 and 2018. That same time period saw the increased establishment of chapters beyond North America, especially in Europe and Asia (Fig. 2).

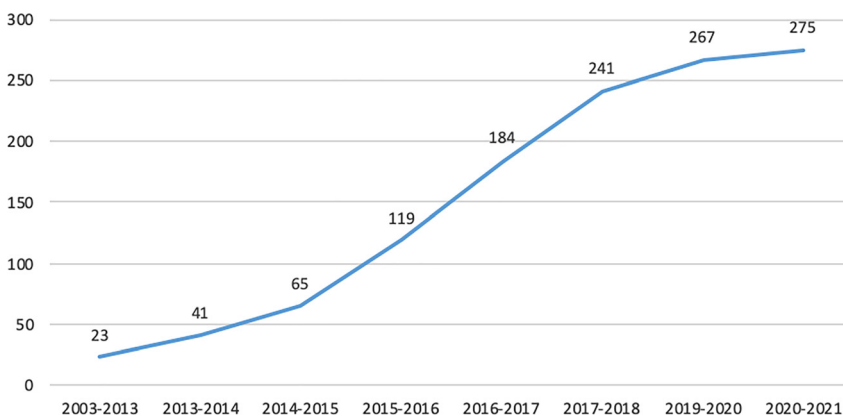


Fig. 1: Growth of ACM-W chapters 2003–2020.

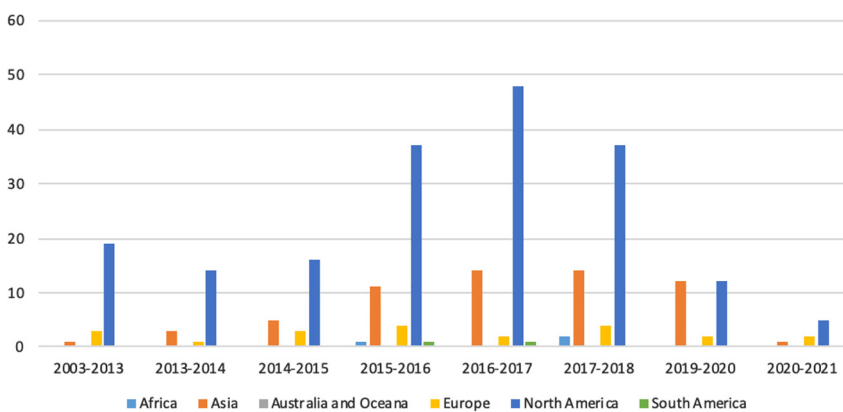


Fig. 2: Growth of chapters by continent 2013–2021.

## ACM celebrations: regional conferences highlighting women in computing

Perhaps the most famous conference focused on women in computing is the Grace Hopper Celebration (GHC), which is sponsored by the AnitaB.org enterprise. GHC is actually a series of events in multiple countries, with the US-based conference now drawing more than 20,000 attendees annually. In 2004, the Indiana Celebration of Women in Computing (INWiC), was established as the first ACM-W sponsored regional conference with a goal of providing the benefits of GHC to students, faculty, and industry professionals who may not have the opportunity to attend the national conference. Additional celebrations in Ohio, Michigan and Colorado soon followed. In 2010, under the leadership of Gloria Townsend, the National Science Foundation awarded grant funding that supported a consortium of organizations (ACM-W, NCWiT, Anita Borg Foundation) to establish more celebrations across the United States. As the grant funding expired in 2013, celebrations had been held in 16 different regions of the US, some having recurred up to five times. Additional events were held in Canada and Australasia, marking the beginning of the globalization of the project. Figure 3 depicts the growth of the Celebrations project by continent since 2013<sup>1</sup>. The project has been very successful in Europe, where the annual all-Europe conference womENcourage has been held annually since 2014.

## ACM scholarships: encouraging research careers

ACM is a leader in promoting computer science research, sponsoring many conferences worldwide and publishing cutting edge journals on virtually every subdiscipline of computing. ACM-W encourages women undergraduate and graduate students to consider careers in computing research by way of the scholarship project. Six times per year, scholarships are awarded that enable young women to attend research conferences. Awardees typically are first time conference attendees and do not need to be making a presentation to apply for funding. Enabled by the generous support of corporate partners Google, Oracle Academy, and Microsoft, ACM-W has been able to award over 420 scholarships since the inception of the program in 2006.

## Partnerships: stronger together

There are many organizations worldwide whose work focuses on the recruitment and retention of women in computing. The purposes and activities of these organizations vary greatly and each contributes something valuable to the greater community. Over the years, ACM-W has benefitted from working collaboratively with several organizations whose missions and programs are complementary to our work. As a global organization,

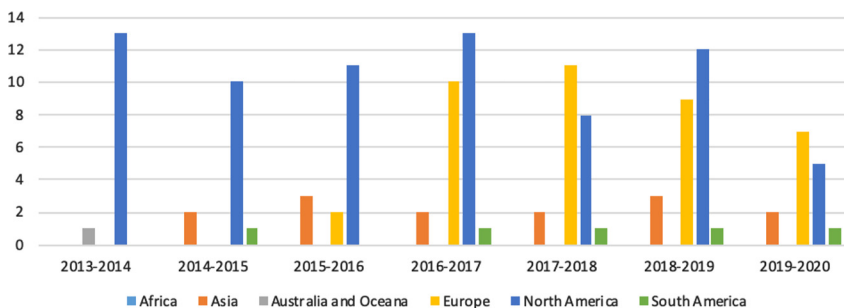


Fig. 3: Growth of celebrations by continent 2013–2020.

<sup>1</sup> Several events were cancelled in 2019–2020 due to the global pandemic. Many events in 2020–2021 are planned in a virtual format.

ACM-W can facilitate the spread of successful programs that are limited to specific geographic regions due to funding concerns. One such program is the Grad Cohort for Women workshop (<https://cra.org/cra-wp/grad-cohort-for-women/>). This program was launched in the United States in 2004 by the Computing Research Association – Widening Participation (CRA-WP) committee with a goal of increasing the participation of women in computer science research by building and mentoring nationwide communities of women through their graduate studies. In 2017, in partnership with CRA-WP, ACM-W launched the International Grad Cohort initiative. This program sponsors teams of faculty from countries outside the United States to attend and observe the US workshops. Upon return to their home countries, the participants organize a similar event. To date, teams have been sponsored from 10 countries and events were held in Greece, India, Kuwait, Spain, Turkey, and the United Kingdom.

The Gender Gap in Science project is another example of the power of collaborative efforts for gender equality. This three-year effort, funded by the International Science Council and 11 partnering scientific organizations, produced a report [5] that details methodologies, insights and tools of the project. The report also makes recommendations for science policy aimed at improving the environment for women in science and increasing the participation of girls and women in scientific study. Following the Gender Gap project, ACM and nine other scientific organizations, formed the Standing Committee for Gender Equality in Science (<https://gender-equality-in-science.org/>). This committee will continue work to promote gender equality by endorsing and promoting the work of the partner organizations.

## Into the future: a vision for ACM-W

The goal of gender equality in computing seems, at times, unreachable. ACM and ACM-W are committed to reaching that goal, however, in order that future research and innovation in computer science are grounded in ethical practices and produce results that benefit all persons and societies equally. The ultimate goal is that organizations like ACM-W will no longer be necessary because gender inequality in computing is non-existent. Until that time, ACM-W will continue to grow our programs, expand our global reach, and deepen our partnerships with other organizations that seek the full participation of women in all sciences.

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**Supplementary Material:** The online version of this article offers supplementary material (<https://doi.org/10.1515/pac-2020-1207>).