

AWM and the Genius of Women: Reflections by AWM's 22nd President

Kristin Lauter

Abstract This article details AWM programs and awards aimed at increasing the visibility of women in mathematics. The author served as AWM president from 2015–2017, with a goal to *build community* for women in research, and to work together on *advocacy and recognition*. She details her journey to create a home and lasting structure for a collection of research networks for women in many areas of mathematics. The AWM Research Networks for Women have brought together an army of women in many areas of mathematics who are empowered to work on behalf of themselves and other women to change the system through proactively promoting each other's work in a way which benefits everyone's careers. The article also describes the process of starting the AWM Hill visits program to advocate for women on Capitol Hill, and the launch of numerous AWM awards, such as the Fellows Program, the Presidential Award, the Dissertation Prizes, and the Student Chapter Awards. To celebrate the genius of women in mathematics requires an organization such as AWM to provide community, advocacy, and recognition, i.e. "The Genius of AWM."

Key words: Mathematics, Research Networks for Women, AWM Hill visits, AWM awards, AWM Springer series

Genius is "where extraordinary talent meets celebrity," writes Janice Kaplan in her 2020 book, *The Genius of Women*. Unfortunately, the "genius" notion creates a vicious cycle for women in any field where "genius" is a prerequisite for success: women are not perceived as geniuses because their work is not celebrated, and their work is not celebrated because they are not perceived as geniuses. Nowhere is this more true than in mathematics, the quintessential "genius" field, a field where the expectation of brilliance is inversely proportional to the participation of women (e.g. Leslie et al., 2015). The 2015 blog post by mathematician and best-selling author Cathy O'Neil (aka mathbabe) summarizes the situation in mathematics as follows:

women are discouraged to go into a field because that field is somehow reserved for "geniuses," and women are rarely if ever bestowed with that label. Mathematics is definitely one of those fields; if you are exceptionally successful in mathematics, people call you a genius, and it's pretty hard to be successful if people don't think you're a genius.

In mathematics research, women have long been underrepresented and their contributions under-celebrated.

But "celebrity" inherently involves community, a collection of people where news is spread. According to Brian Hayes (2002):

Mathematics and other kinds of science are so intensely social that only the most extraordinary talent could overcome the handicap of isolation. It takes more than a village to raise a scientist, it takes a village full of scientists.

My own experience in the research mathematics community after graduate school led me to believe that indeed the "genius of women" in mathematics is severely under-celebrated, but that to fix that problem, we needed to *build community* for women in research, and to work together on *advocacy and recognition*.

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This belief led me into the leadership of the almost-50-year-old Association for Women in Mathematics (AWM) to start the AWM ADVANCE program of Research Networks for Women. Over the last 10 years, the AWM ADVANCE networks have, in effect, created an army of women in many areas of mathematics who are empowered to work on behalf of themselves and other women to change the system through proactively promoting each other's work in a way which benefits everyone's careers. In this article, I detail that journey, along with related AWM initiatives focused on advocacy and recognition. To me, the trifecta of community, advocacy, and recognition that AWM provides for women and girls in mathematics is what I call the "Genius of AWM."

Personal History

I was president of AWM from 2015 to 2017. I served a four-year term 2014–2018, including one year as president-elect and one year as past president. Before that I served for two years on the AWM Executive Committee and before that a term on the AWM Long-range Planning Committee. I am grateful that this volume gives me a chance to reflect on the impact my service to AWM had on my own life and career, the programs I started during my leadership of the organization, and the benefit and the continued role and importance of AWM. I put the lion's share of my energy into launching Research Networks for Women, which led into the AWM ADVANCE program, so I focus a large part of this article on explaining that work. In tandem, to promote advocacy and recognition, I am extremely proud of having started the AWM Hill visits program to advocate for women in mathematics on Capitol Hill, and my efforts to help launch numerous AWM awards, such as the Fellows program, the presidential award, the dissertation prizes, and the student chapter awards.

I benefited tremendously from AWM support early in my career. When I was on the job market, I was funded to attend the Joint Mathematics Meetings as a participant in the AWM workshop. As a Hildebrandt Assistant Professor at the University of Michigan, I received an AWM Mentoring Grant to work with Jean-Pierre Serre at the Collège de France in Paris for a month (see Figure 1). I published two research articles, each with an appendix by Serre, in the *Journal of Algebraic Geometry* and *Compositio Mathematica*. This collaboration helped advance my research and my confidence. Serre has written letters of recommendation for me throughout my career, which helped me obtain job offers, including my position at Microsoft Research.

Fig. 1 Working with J.-P. Serre in a Parisian café thanks to an AWM Mentoring Grant in 1999. Drawing by E. Bombieri



While I was AWM president, I worked approximately 20 hours per week of volunteer time for AWM, on top of my full-time job in industry as a Principal Researcher and Research Manager of the Cryptography Group at Microsoft Research. I was one of the few AWM presidents from the high-tech industry, and there was no release-time or staff

support granted to me by my employer. In addition, my twin daughters were teenagers at that time. My husband took on a greater share of family responsibilities to enable my extra work and travel. Despite all these challenges, it was the most invigorating and inspiring four years of my career. I had so many ideas for creating community and recognition for women in mathematics, and I could not bear the thought of missing my chance to launch them.

My mother, Estella Lauter, helped to design a women's studies minor at a University of Wisconsin campus in 1977, and I am obviously cut from the same cloth. My father spent his career as dean of students at a liberal arts college, and he was a role model for me for starting programs to create community for students. Reinvigorating and building up the AWM student chapters program was a perfect outlet for my passion in that direction. My twin daughters traveled with me to AWM conferences and to the International Congress of Mathematicians (ICM) in Korea in 2014, where the Fields Medal was awarded to a woman for the first time, and it changed their attitude towards math. They volunteered at AWM events such as the AWM Research Symposia in 2015 and 2017 (see Figure 2). Three years later, they were studying mathematics and computer science as undergraduates at the University of Chicago, my alma mater.

Fig. 2 Joyce and Josephine Lauter Passananti taking conference photos and selling AWM t-shirts, pendants, earrings, and pins during the 2017 AWM Research Symposium, UCLA



I have spent a large part of my career in the high-tech industry as “the only woman in the room” in most leadership team meetings. The technical workforce in the high-tech industry is about 10–15% women, even in the year 2020. For those in a small minority, normal interactions may be distorted by hidden biases. I often felt early on in such meetings in industry that I was irrelevant to the conversation, I had no opportunity to speak, I had nothing to say that anyone would listen to, or if I did finally speak, that my voice was not heard.

In contrast, my four years as a volunteer in the leadership of AWM was a breath of fresh air, offering the chance to launch many new programs and prizes to support, recognize, and advance women and girls in mathematics and to work together with women around the world. I was floored by an outpouring of energy and excitement from young women mathematicians who felt empowered by the support and opportunities AWM provided and immediately offered their time and commitment to help build the programs. This was particularly true in the Research Networks for Women initiative.

I earned my PhD in mathematics from the University of Chicago in 1996. After a decade of going to number theory conferences around the world with almost no women speakers and few women participants, in 2006 I decided to try to change that. Renate Scheidler, Rachel Pries, and I organized the first Women In Numbers (WIN) conference, a Research Collaboration Conference for Women (RCCW), leading to the creation of a Research Network for women in number theory. It was the best and most impactful initiative of my career; it led me into the leadership of AWM to spread the Research Networks for Women to all areas of math.

The Genius of Community: Research Networks for Women

Imagine a conference center in the Canadian Rockies where 42 women mathematicians spend five days working together on research problems in mathematics in groups of five or six. The groups include graduate students and postdoctoral researchers who apply to work in groups led by more senior women researchers. The research problems are posed and the groups formed several months in advance, and the group members continue to work together after the conference to write a paper for publication. That is the model we designed and launched for WIN, the first Women In Numbers conference at Banff International Research Station (BIRS) in 2008 (see Figure 3).

Fig. 3 First WIN conference, November 2008, Banff International Research Station (BIRS), one of several mathematics institutes in North America



After the 2008 WIN conference, the organizers and many of the participants worked together to form the WIN network: a research community for Women In Number Theory. Michelle Manes created an email distribution list and organized follow-up special sessions at AMS meetings; Katherine Stange created a website highlighting women in number theory; we created a Steering Committee to plan future meetings, and we published a proceedings volume of the research papers from the WIN groups.

Since then the WIN Network has run seven more conferences on this model: WIN2, WIN3, WIN4, WIN5 at BIRS in 2011, 2014, 2017, 2020, and WIN-Europe (WINE), WINE2, WINE3 in 2013, 2016, 2019 in France and Holland. These conferences involved more than 200 women in number theory from around the world, were organized by more than 20 distinct women, many of them participants in the first WIN conference, and produced more than 50 published research papers in six proceedings volumes. When we started planning the first WIN conference in 2006, there were three women professors in number theory at top research universities in the US; now there are several dozen women faculty in number theory at such institutions. The success of the WIN model was palpable from the very first conference:

the BIRS staff said they had never experienced such energy and excitement from workshop participants, although they had been running week-long workshops 50 weeks per year for many years. I personally enjoyed my professional life and going to conferences so much more as part of the growing WIN community. I started organizing WIN reunions at other conferences in number theory and they are now a regular occurrence.

Early adopters helped to push the WIN model into other areas of mathematics. Maria Basterra is one of my best friends from graduate school, and after we discussed the WIN model at the 2011 AWM Research Symposium, she launched Women in Topology (WIT) with Kristine Bauer by submitting a modified version of the WIN proposal through the usual scientific channels at BIRS (WIT workshops were held in 2013, 2016, 2019). Kathryn Leonard and Luminita Vese organized Women in Shape Modeling (WiSh) at the Institute for Pure and Applied Mathematics (IPAM) in 2013, securing funding from private sources and companies to launch it, and I was able to provide some funding through Microsoft Research. When I gave a public lecture at the Institute for Mathematics and its Applications (IMA) in 2012, I talked with the IMA Director Fadil Santosa, and he agreed to run one conference on the WIN model per year, for three years, again with some small co-funding I provided from Microsoft Research. The first three RCCWs hosted by the IMA were:

- WhAM! Women in Applied Math, Dynamical Systems in Biology (2013).
- WINASC: Women in Numerical Analysis and Scientific Computing (2014).
- WinCompTop: Women in Computational Topology (2016).

Georgia Benkart, Stephanie van Willigenburg, and Monica Vazirani had earlier organized the first conference for Women in Algebraic Combinatorics at BIRS in 2011 on a slightly different collaborative model. Georgia later launched another Research Network, Women in Noncommutative Algebra and Representation Theory (WINART), with Ellen Kirkman, Susan Montgomery, and Chelsea Walton. My personal involvement in the support and creation of these first few spin-off networks was intense, fast-paced, and heartfelt. I kept all the organizers, conference dates, and publication volumes in my head and communicated frequently by email with all the new networks.

Based on the preliminary success of the WIN model in number theory and these other areas, I was motivated to join the leadership of AWM to spread the model to all areas of mathematics. In 2014 when I was president-elect, President Ruth Charney, Executive Director Magnhild Lien, and I wrote and submitted a \$750,000 five-year grant proposal to the National Science Foundation in the ADVANCE program to support Research Networks for women. The grant was awarded in September 2015 when I was president, and I served as the Principal Investigator (PI) for this grant from 2015 to 2020, with Magnhild Lien as quarter-time project director. Current AWM President-elect Kathryn Leonard served on the Oversight Committee. The goal of the AWM proposal, Career Advancement for Women through Research-focused Networks, is to build and sustain Research Networks (RNs) for women in many areas of mathematics. The program has supported more than 1,000 women researchers in 20 Research Networks so far.

AWM Research Symposia

In 2009, I met Georgia Benkart when she was AWM president and we both spoke at a biannual conference of the Korean Women in Mathematical Sciences (KWMS). We shared an apartment at the Korean Institute for Advanced Study (KIAS). I got the idea that we should have such a research conference to highlight the work of women mathematicians in North America. I thought that AWM could host it and I started discussing the idea with Georgia. A few months later, Georgia contacted me and invited me to co-organize the first AWM Research Symposium with her and Jill Pipher at Brown University and the Institute of Computational and Experimental Mathematics (ICERM). It took place in 2011 to celebrate the 40th anniversary of AWM, when Jill Pipher was president of AWM and founding director of ICERM.

The AWM Symposia are typically two-day weekend meetings, run on the model of the AMS sectional conferences, with high-profile plenary speakers and special sessions organized on focused research topics. The Symposia aim to bring women mathematicians together to recognize and celebrate their research contributions and achievements, and to network and build community in order to advance their careers and improve working conditions. Professional development activities include a non-academic jobs panel, an exhibit hall, and networking opportunities. Since 2011, a Symposium has been held every two years.

Symposium 2015

The third AWM Research Symposium took place at the University of Maryland in April 2015. The Symposium was organized by Ruth Charney, Shelly Harvey, Gail Letzter, Magnhild Lien, Konstantina Trivisa, Talitha Washington, and myself, with many outstanding mathematicians volunteering to organize the 14 special sessions representing a wide swath of mathematics. The scientific program featured plenary lectures by Ingrid Daubechies, Maria Chudnovsky, Jill Pipher, and Katrin Wehrheim.

The format was similar to the 40th Anniversary Symposium at Brown and the 2013 Research Symposium at Santa Clara, but there were several new aspects. We inaugurated the AWM Presidential Award. Past president Ruth Charney and I gave the first award at the banquet to the founders of the EDGE program: Sylvia Bozeman and Rhonda Hughes. EDGE (Enhancing Diversity in Graduate Education) is a program with a strong record of supporting graduate students and building community among women from diverse backgrounds. To help celebrate the EDGE program, Shirley Malcom (AAAS) delivered an inspiring keynote address, followed by moving acceptance speeches from Sylvia and Rhonda (see Figure 4).

Fig. 4 Banquet at 2015 AWM Research Symposium. Standing: AWM Presidential Award winner Sylvia Bozeman, former AWM presidents Kristin Lauter and Jill Pipher. Sitting: Former AWM Executive Committee member Talitha Washington, 2015 Keynote Speaker Shirley Malcom, and former AWM president Ruth Charney



The networking reception featured a jobs panel moderated by Gail Letzter, with representatives from industry and government: Gagan Aggarwal (Google), Lily Chen (National Institute of Standards and Technology), Michelle Dunn (National Institutes of Health), Deborah Lockhart (National Science Foundation), Adele Merritt (National Security Agency), and Philip Whitman (INTECH). At the end of the jobs panel, the Wolfram Best Poster Prizes were awarded to Jessica Fintzen, Ariana Minot, and Beth Romano. For more details and pictures, see the blog (Haensch and Salerno, 2015).

The Symposia, while requiring many hands and significant funding to realize, have proved to be invaluable for building community among women mathematicians, showcasing women's work in mathematics, and attracting attention, support, and sponsorship for the AWM mission. A proceedings volume highlighting the research presented at the 2015 Symposium appeared in the AWM Springer series.

Symposium 2017

Supported by the NSF ADVANCE grant, the fourth AWM Research Symposium was held in April 2017 at the University of California Los Angeles (UCLA) and the Institute for Pure and Applied Mathematics (IPAM). The Symposium was

co-organized by Raegan Higgins, Magnhild Lien, Ami Radunskaya, Tatiana Toro, Luminita Vese, Carol Woodward, and myself.

The four plenary speakers were AWM past president Ruth Charney, AWM Sadosky Prize Winner Svitlana Mayboroda, Blackwell-Tapia Prize Winner Mariel Vazquez, and the first AWM-SIAM Sonia Kovalevsky Lecturer Linda Petzold. The second AWM Presidential Award was presented to Deanna Haunsperger, then president-elect of the Mathematical Association of America (MAA). This award honors her enduring contribution to advancing the mission of the AWM through her work to establish and run the Summer Math Program (SMP) at Carleton College.

In addition to the 12 special sessions by the ADVANCE Research Networks, there were special sessions associated to plenary talks, and innovative sessions such as SMPosium: A celebration of the Summer Mathematics Program for Women, an EDGE session, Women in Government Labs, Women in SAGE (System for Algebra and Geometry Experimentation), along with sessions on mathematics education, history of mathematics, statistics, and areas of pure math. Also, Marie Vitulli and Ursula Whitcher organized an exciting event: a Wikipedia edit-a-thon to expand Wikipedia's coverage of women in mathematics. On the first evening, IPAM hosted a welcoming event focusing on students and AWM student chapters. The banquet on the following evening featured a networking event and a jobs panel.

Symposium 2019

The fifth AWM Research Symposium was held at Rice University in April 2019 (see Figure 5). It attracted more than 350 women and hosted more than 20 special sessions in different research areas. I enjoyed tremendously being a plenary speaker at the symposium and reuniting with many women friends and collaborators.

Fig. 5 2019 AWM Research Symposium, Rice University. Photo courtesy of Shelly Harvey



NSF AWM ADVANCE Program Components

The AWM ADVANCE program supports the launch and development of Research Networks for Women by running numerous activities, coordinated by the PIs and Oversight Committee, and almost entirely staffed by volunteers. First, we set up two committees:

- *RCCW Committee*. Chaired for the first three years by Michelle Manes, and now by Erin Chambers, this committee helped research networks form in new areas by accepting proposals twice a year. The chair assigned each proposal

to a committee member to help edit and match with one of the math institutes to submit a conference proposal through their competitive processes.

- *RN Committee*. Chaired initially by Sigal Gottlieb, then Kathryn Leonard, and later by me, this committee helped the formation of strong research networks after an initial RCCW. The Research Networks were encouraged to:
 - form a Steering Committee;
 - appoint a webmaster to create and maintain a webpage;
 - use a listserv to facilitate communication;
 - organize follow-up events such as special sessions and AWM workshops;
 - publish a proceedings volume in the AWM Springer series;
 - publish accounts of their networks in the *AWM Newsletter*.

The AWM ADVANCE grant provided overhead support for AWM and funded the following:

- Project director, a quarter-time position.
- Web developer, to create the AWM ADVANCE webpage, which hosts webpages for each Research Network and provides a framework and global information about the grant and programs.
- Travel funding to allow participants to attend RCCWs and follow-up workshops at JMM and SIAM meetings. The grant provided more than \$70,000 in participant support for each of the 2017 and 2019 Symposia.
- External evaluator.

AWM coordinates the RNs, sponsors the RCCWs, and runs the Symposia and the follow-up workshops at JMM and SIAM meetings. So it makes sense that the ADVANCE grant provided overhead support to AWM. What doesn't make sense is that none of the other conference grants that AWM receives to pay for participant costs to *attend* AWM workshops include any overhead to cover the costs to *run* the workshops. This perpetuates the problem that women devote more of their time and professional energy to helping other women and minorities in mathematics, detracting from their own research and career advancement. Almost all of the work of AWM is still done by volunteers: more than 200 people, almost all women. The women in the AWM leadership who write and win the grants to support more junior women and the volunteers who organize and run the workshops are rarely acknowledged for the hard work they put in. For this reason, I always try to assure that the organizers for the AWM workshops and Research Symposia are prominently featured in the conference materials and recognized at the conference.

AWM Springer Series

After the first WIN conference, I was asked by a male colleague in number theory, "But what do you do at these WIN conferences, talk about women in number theory?" I was shocked that he did not realize that we were solving important number theory research problems. But we had the perfect answer for him and anyone else who doubted the mathematical quality of the initiative: we published proceedings volumes of research articles produced by the working groups at the first two WIN conferences!

The importance of publishing these volumes of research articles cannot be overstated. In addition to providing a record of the research done by the groups showing the serious nature of the conferences, the publication volumes play a fundamental role in the formation of the networks in several other ways:

- In order to finish their papers for publication, groups formed at the workshop need to keep working together remotely after the conference. This helps to cement the collaboration and mentoring relationships.
- Setting a deadline for the submissions to the volume roughly 6–9 months after the conference provides a schedule and incentive for groups to finish up their results.
- Often graduate students and postdocs ask the group leader(s) for recommendation letters based on their contributions to the paper. This is time-sensitive at the career stage where they are applying for jobs, so the relatively quick publication of the papers is crucial.
- Follow-up AWM workshops highlight the research papers in the volumes by inviting the authors to present the work in special session format.
- At an early career stage, more experience in the publication process and adding another paper to the resume can be helpful for professional development and a successful job search. As this is one of those "critical transition points" in the leaky pipeline, this can help to enable more women to continue in the research mathematics profession.

- Once a group of 4–7 mathematicians has started working together on a research problem, it is important to publish at least the preliminary results, so that everyone in the group can get credit for their contributions. Those group members who have time and interest can form spin-off collaborations to continue to develop further results after the initial publication.
- For further development and organization of the Research Networks, it is helpful to have artifacts such as volumes of published research papers, to show the work done by women in the area and to argue for the importance of funding subsequent conferences for women in the area.
- The editors have often invited some contributions from women researchers who were not at the conference, so the volumes serve to highlight work by women in the area more broadly.
- Many women organizers, editors, and reviewers get valuable experience in the publication process through their work to produce these volumes.
- Some argue that it is better for women's careers to publish in journals. Groups can still choose to publish results in a journal in addition to their contribution to the proceedings. In that case the article in the proceedings may be expository. But I argue that it is still beneficial to the broader network of women in the area to publish a proceedings volume, for the other reasons listed here.

The WIN 2008 volume was published by the Fields Institute in their series, and the 2011 WIN2 volume was published in the Centre de recherches mathématiques (CRM) series. This made sense because both conferences were hosted at BIRS in Canada, with Canadian co-organizers Renate Scheidler and Chantal David. The proceedings of the first two conferences at IMA were published in the IMA Springer series, and co-branded with the AWM logo.

But I wanted to have a venue for all of these proceedings to appear in the same series. In 2014 when I was president-elect, President Ruth Charney invited me to work with Springer editors to develop a proposal for an AWM book series. This was the perfect opportunity to create a home for the proceedings volumes of research articles produced by the collaboration groups at the Research Collaboration Conferences for Women.

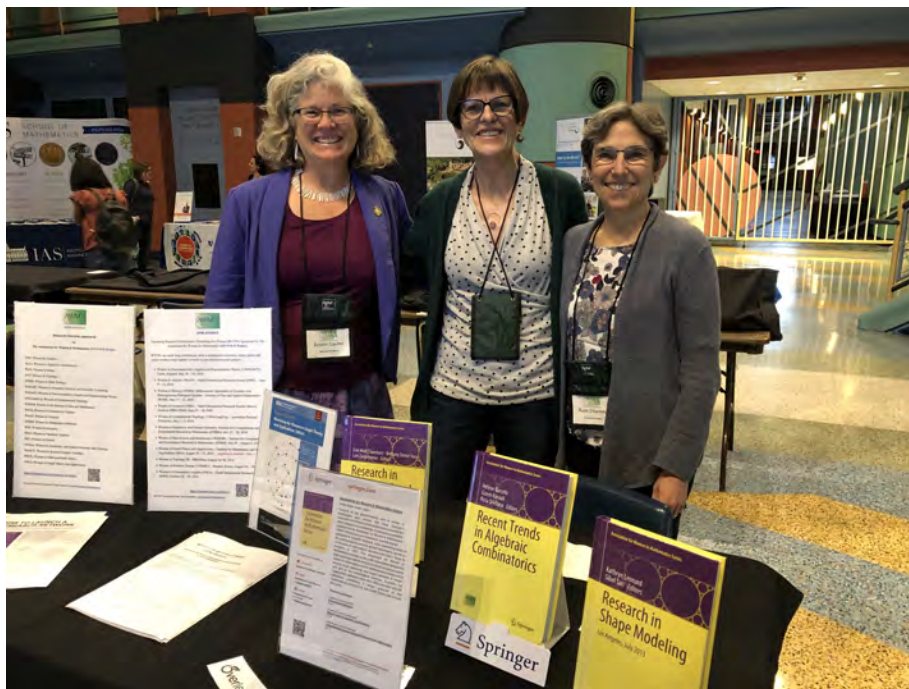
Later that same year, we launched the AWM Springer series to publish the proceedings of RCCWs, AWM workshops, the AWM Research Symposia, and other AWM events and panels (see Figure 6). A list of the more than 20 published volumes to date is available on the series webpage. The subsequent four volumes from the WIN conferences have already appeared in the series, and several volumes each from WiSh and WIMB (Women In Math Biology), along with the three volumes from the 2015, 2017, and 2019 AWM Research Symposia, a volume on mathematics education based on an AWM-AMS panel at JMM, a volume on the history of women in mathematics based on an AWM contributed papers session at the MathFest 100th anniversary of MAA, and two volumes on harmonic analysis in honor of the late past president of AWM, Cora Sadosky. Other volumes include a collection of papers by former EDGE participants and the proceedings from the first World Meeting for Women in Mathematics (WM)², which was held in 2018 in Rio de Janeiro, Brazil. AWM received a \$1,000 commission per volume for the first five years of the contract, and I negotiated an increase to \$1,500 per volume for the second five-year contract. I continue to serve as the founding editor for the series, and we are constantly soliciting new volumes—please let me know about ideas!

Results to Date

We have far exceeded expectations for the success of the first AWM ADVANCE grant, having launched and sustained 20 Research Networks in the first four years. At the 2017 and 2019 Research Symposia, Magnhild Lien and I hosted brainstorming and networking lunch discussions for Research Networks, explaining the model, and inviting women to form networks in new areas. At least three or four new networks were germinated at each of those sessions. The RCCW committee has refined its processes over the last five years and has learned to help target proposals strategically to numerous institutes so that BIRS is not overrun with proposals each year. The RN committee has created materials to help new networks organize themselves: “RN-in-a-box.” In addition to BIRS, RCCWs have been hosted annually by North American institutes AIM, ICERM, IMA, and IPAM. Networks have also run their conferences at various mathematics institutes in Europe, for example, Hausdorff, Henri Lebesgue, Lorentz, Luminy, and Nesin Village.

The external evaluator for the program is sociologist Erin Leahey. She and her students and collaborators have studied the program and its outcomes. Together we designed surveys for each RCCW, AWM workshop, and Symposium. We have surveyed 1,000 distinct researchers, with many more additional participants also part of the study. Leahey and her collaborators have coded CVs to gather information about workshop participants' job search outcomes, grant activity,

Fig. 6 PIs for the AWM ADVANCE Grant Kristin Lauter, Magnhild Lien, and Ruth Charney with AWM Springer series volumes, 2019 Research Symposium, Rice University



invited talks, and leadership roles. They have also scraped data from Google Scholar to gather information about workshop participants' productivity.

Although we do not have the results of the first stage of the study as of this writing, we can see already anecdotally the impact that the collaboration model and the Research Networks are having on careers for women in research mathematics. In specific research areas such as number theory, the number of tenure-track and tenured women faculty at PhD-granting institutions has increased dramatically. The number of special sessions at AMS meetings co-organized by women and the number of women speakers has also increased dramatically. The number of invited speakers at annual international number theory conferences has similarly increased. WIN is the oldest network, started more than 10 years ago. It remains to be seen what the effect on women's careers from some of the more recently formed Research Networks will be.

Gathering input from the surveys, we hear stories of the transformative effect that these research collaborations have had on women's careers, allowing them to achieve some visibility in their field, to get a job, to get an article published in a top journal, to get tenure, or to feel empowered to continue in their research careers. We plan to assess the results of the study from the first five years and use the learnings to tweak our format and activities for the next cycle.

We have also seen some systemic change happening already in the research mathematics community in response to our Research Networks for Women approach. First, the AMS Council voted on, and approved, a revision to its recommendations on procedures for tenure and promotion evaluation wherein they noted that, due to the increased collaboration in the field stemming from conferences run on the WIN model, letters from collaborators should be allowed.

Second, the Mathematical Sciences Research Institute (MSRI) has created a Summer Research in Mathematics program, SRiM, to host follow-up collaboration meeting opportunities for groups of 4–6 researchers to come to MSRI in the summer to continue research on a project such as one started at an RCCW.

Another mark of success is the demand for participant slots at RCCWs. For many of the networks, including WIN, WIT, WIMB, . . . , the acceptance rate is about 20%. For example, BIRS workshops support 42 participants, and with two group leaders for each of eight groups, plus organizers, that usually leaves around 20 open slots for participants to apply to. WIN workshops have received around 100 applications. This means that the quality of accepted participants is extremely high, but it also means that many do not get to participate. Some WIN organizers have taken the approach of accepting mostly women who have not yet attended a WIN conference, in order to spread opportunity around and continue to grow the community.

Broader Impact

According to a survey (AMS, 2015), women received 30% of the PhDs awarded in math but still comprised only 17% of the tenured or tenure-eligible faculty at PhD-granting institutions. The situation is much worse at elite institutions. For example, in 2015, the percentage of women mathematics faculty at Harvard, MIT, Yale, Princeton, Chicago and Brown ranged from 4% to 8%. (These have improved slightly over the last five years.) A study of 435 math research journals found that only 8.9% of editors were women (Topaz and Sen, 2015).

For many years, leaders of AWM have tried various approaches to draw attention to the problem of underrepresentation of women and minorities in research mathematics, the lack of equity in resources and access, and the barriers for women and underrepresented minorities to advance their careers in the mathematical profession. For example, AWM created a policy of writing letters to conference organizers who had zero women speakers at their conference. The letter came from the AWM president and was very professional and polite. We have tried writing letters to chief editors of top journals with no women on the editorial board and arguing on AMS Council for more diversity on editorial boards of leading AMS journals. We have tried writing to the presidents of major institutions to urge them to hire more women into their math faculty. Frustrated by slow progress stemming from such complaints, I was motivated to take an independent approach by creating the WIN model, which led to the AWM ADVANCE program.

The philosophy of the AWM ADVANCE grant is to change the ecosystem. Our model for making change was based on the observation that the mathematics research community itself is a network with its own hierarchical structure. So to integrate with that, we created Research Networks for women in a scalable way which can help advance women's careers in the existing hierarchical structure where women are underrepresented and have less power.

There are now armies of women in many areas of mathematics who are empowered to work on behalf of themselves and other women to change the system through proactively promoting each other's work in a way which benefits everyone's careers. We needed a way to circumvent the problem that women spend so much of their professional energy trying to help advance women and minorities, thus falling behind men who have more time for their research. In the ADVANCE model, project leaders are essentially rewarded for effective mentoring by having excellent junior research collaborators in their research group advancing and giving increased visibility to the group leader's research agenda.

Next Steps

How do we leverage the success of the AWM ADVANCE networks to continue to accelerate change in the broader math community? An important ongoing objective is to strengthen the interactions between the research networks for women and men in the dominant hierarchy. Men are incentivized to help and to participate in the networks for women for many reasons. Many senior men want to help their PhD students succeed, so they recommend the women for acceptance to RCCWs, where competition for spots may be stiff. Also, many junior men benefit from the energy and network of the women organizing special sessions and become co-organizers and collaborators. There are men co-authors on papers in the WIN volumes and in volumes by other networks (WiSH, WiSDM, WinCompTop, . . .). As men see the success of research groups consisting entirely of women, they are at first surprised, but then often engaged by the research and energy and sometimes become enthusiastic allies. Men are often reviewers for the papers in the AWM volumes. The collaboration model for conferences is pretty new in mathematics, simultaneously started independently at WIN and the AMS Mathematics Research Conferences (MRC). But it has been so successful for institutes and funding agencies who like the publication model, that it is being copied as a model for mixed-gender conferences (for example at IPAM, the Simons Institute, and the University of Oregon).

As we continue to build and spread the influence of Research Networks for women, communication to the broader math community is crucial. To spread the word, I and others have written accounts of the AWM ADVANCE networks in numerous places. In my accounts, I took care to highlight the names and contributions and hard work of so many women organizers for the Research Networks and AWM Committees. Please see my many bimonthly President's Reports, the Research Symposia reports, and the AWM ADVANCE reports in the *AWM Newsletter* and the AWM ADVANCE website for more information.

The Genius of Advocacy: Selected AWM Initiatives and Programs (2014–2018)

AWM Hill Visits

I served on the AMS Council from 2014–2017, substantially overlapping with my term as president of AWM. This was unfortunate from the point of view of demands on my time, but fortunate from the point of view of cross-fertilization of ideas. An excellent example of the benefit is the AWM Hill visits program. As a member of the AMS Committee on Science Policy, I was invited to Washington, DC, in spring 2014 to take part in a day of visits to Capitol Hill organized by the AMS, to argue on behalf of funding for scientific research. In preparation, on the day before going to the Hill, we received training from Karen Saxe, professor of mathematics at Macalester College who was spending a year as an AMS Congressional Fellow in Senator Al Franken’s office. It was a transformative experience for me to realize that as citizens, voters (constituents), and members of society, we can directly make appointments to visit our elected officials and argue on behalf of our priorities. It was clear to me that it would be empowering to invite a diverse set of representatives to these Hill visits—in 2014 I was the only woman on the AMS Committee at the meeting, and there were no underrepresented minorities.

Over drinks at the reception, Karen and I talked about starting a program of Hill visits for the AWM. I didn’t know how I was going to do it, but in April 2015, the opportunity presented itself.

The 2015 AWM Research Symposium was hosted at the University of Maryland, and I invited all AWM Executive Committee members to join me in a day of visits to Capitol Hill in DC on the day after the Symposium. The only EC member who joined me was Talitha Washington, professor at Howard University. We made appointments at numerous offices, including meetings with Congresswoman Eddie Bernice Johnson (see Figure 7), and congressional staff in the offices of Senator Kirsten Gillibrand, Senator Patty Murray, and Representative Paul Tonko. We introduced ourselves and AWM, and we argued on behalf of STEM outreach funding and initiatives. Representative Johnson asked for a list of women in mathematics who would be willing to speak at local events in her district in Dallas. We discussed Tonko’s bill, Educating Tomorrow’s Engineers Act of 2015 (H.R.823), and Obama’s initiative to increase the STEM workforce. I followed up with a phone meeting with the White House Council on Women and Girls, and I tried to get the AWM Essay Contest winner invited to the annual White House Science Fair.

Fig. 7 AWM President Kristin Lauter meeting with Representative Eddie Bernice Johnson, April 2015



This was the beginning of shaping a broader advocacy agenda than just arguing for increased funding for research in science. The next golden opportunity awaited us in August 2015, since much of the AWM leadership was planning to return to Washington, DC, for the 100th Anniversary of the MAA MathFest. This time, we were able to involve leaders from AWM student chapters (Clarkson, Clemson, Colorado School of Mines, Georgia College, James Madison, UT

Arlington) who were presenting at a special poster session at MathFest organized by Kathleen Fowler. Karen Saxe provided background materials and an hour-long, in-person training session for the students and AWM leadership in the morning, at the conference hotel before heading to the Hill.

We organized into three groups led by Executive Director Magnhild Lien, Past President Ruth Charney, and myself. Group leaders had made the appointments on behalf of the groups, focusing on offices in districts where the students were constituents. We argued on behalf of the STEM Gateways Act (S.1183 and H.R.840) introduced by Senator Gillibrand and Representative Kennedy, which aimed to increase the participation of women, girls, and underrepresented minorities in STEM fields by authorizing the Department of Education to create a competitive grant program. We also showed our support for the STEM Opportunities Act of 2015 (H.R.467) introduced by Representative Eddie Bernice Johnson, to require federal agencies to collect more comprehensive demographic data on the recipients of federal research awards and on STEM faculty at US universities, and to promote data-driven research on the participation and trajectories of women and underrepresented minorities in STEM (see Figure 8).

Fig. 8 Heading to Capitol Hill, Julie Skinner Sutton, Kirsten Morris, Leah Granger, Rebecca Swanson, Ruth Charney, Adriana Salerno, Karen Saxe, Magnhild Lien, Sarah Greenwald, Ami Radunskaya, Kristin Lauter, MathFest, August 2015



I wrote about these visits in my President's Reports in the *Newsletter*, inviting broader participation. We involved students in writing an article for the *Newsletter* detailing the visit and posted photos on the AWM Facebook page. In a subsequent meeting of the AWM Advisory Board, Mary Gray advised setting up a regular program of Hill visits through the AWM Policy and Advocacy (P&A) committee. That year, Gail Letzter was elected to the AWM Executive Committee. When her term started in February 2016, I convinced her to serve as chair of the P&A committee and to help set up the program, with the help of Karen Saxe, who graciously accepted an appointment (more like a plea!) to join the committee. Together they led P&A to develop a more comprehensive policy agenda and legislative priorities.

To set up a regular cadence for visits, the committee agreed to my proposal to schedule two visits per year to coincide with the CBMS meetings in Washington, DC, in May and December. Since AWM is a member association of the Conference Board of the Mathematical Sciences (CBMS), AWM always sends at least one representative from the leadership team to the meeting. In particular, beginning in May 2015, I served on the Executive Committee of CBMS, so I attended every meeting. I announced the Hill visits program in my May–June 2016 President's Report, and the legislative priorities for AWM formulated by the committee were published in the July–August *AWM Newsletter*. The priorities were:

- Expand STEM educational opportunities.
- Support research funding.
- Improve work–life balance: expand childcare and family leave options.

- Modernize self-perpetuating mechanisms that limit public recognition of women's achievements.
- Create a welcoming environment in science and education, including policies to address sexual harassment and violence on university campuses.

On our next visit in May 2016, I was accompanied by Executive Committee members Talitha Washington and Talitha Williams. We discussed our AWM legislative agenda with staff in the offices of Representatives Barbara Lee and Jackie Speier, among others. Later, we supported the bill Computer Science for All (H.R.6095), which was introduced by Representative Lee and several cosponsors. In fall 2016, Representative Speier introduced the Federal Funding Accountability for Sexual Harassers Act (H.R.6161), and we were invited to her office during the December 2016 visit to meet with her.

Our December 2016 visit was the most exciting and successful visit to date. Beth Malmskog and Katherine Haymaker, faculty mentors for the AWM student chapter at Villanova, drove nine students down from Pennsylvania for the day to join the AWM Hill Day. Our top legislative priority was the Women and Minorities in STEM Booster Act of 2016. We also spoke in support of the Computer Science for All Initiative, the INSPIRE Women Act, and the bill introduced by Representative Speier. Her bill required that sexual harassment by Principal Investigators be reported to funding agencies, and that harassment reports be considered when awarding federal funding.

We attended a breakfast hosted by Pennsylvania Senator Bob Casey, visited more than 20 congressional offices in groups, and met several other members of Congress on both sides of the aisle. The visit was captured enthusiastically by Beth Malmskog in her post for an AMS blog. Students in my group that day and during the August 2015 trip told me that taking part in the day-long Hill visit had "changed their lives." There is evidence that our Hill visits have had an impact. Representative Eddie Bernice Johnson spoke about AWM support for one of her bills on the floor of the House. However, possibly the greater impact the program has had is on us, the women and men of AWM and AWM student chapters who have participated in these visits, empowering and inspiring us to continue to make a difference by supporting each other and fighting for change.

In total, I organized and led four AWM Hill visits to Capitol Hill, two per year in 2015 and 2016, in addition to the two Hill visits I did as part of the AMS contingent. In 2017, my term as AWM president ended, I stepped down from the Executive Committee of CBMS, and left the AWM Hill visits program in the capable hands of Gail Letzter and Karen Saxe (Karen is now Director of the Office of Government Relations of the American Mathematical Society, based in Washington, DC). They created a P&A subcommittee, the Government Advocacy Committee, to run the program. Please see Letzter and Vitulli's article in this volume describing that process. Michelle Snider served as chair and continues to run it successfully. See her article in this volume.

AWM Student Chapters

Student chapters at colleges and universities are one of AWM's greatest assets. They provide a way to advance our mission by building community, supporting education and developing careers of students, and advocating for women in math on college campuses. During my term I focused on ramping up efforts to support our student chapters. My first goal was to double the number of AWM chapters, which we roughly achieved. In 2020, we currently have more than 100 active AWM student chapters.

I had met with several chapters and heard that they did not feel at all connected to AWM as an organization. It is hard to keep up with them since their leadership and membership changes every year. So I worked with Kathleen Fowler, chair of our Student Chapter Committee, to create new processes to support the chapters.

I introduced an annual webinar for student chapter presidents to meet with the AWM president and discuss ideas with each other. I hosted the webinar in November 2015 and 2016. More than 30 chapters were represented at the webinar and many new ideas were proposed and discussed.

To increase visibility, I worked with Newsletter Editor Anne Leggett to resurrect a "Student Chapter Corner" in the *Newsletter* to publish articles from the chapters on their activities. AWM revitalized the student chapter Facebook page, and created online folders for chapters to share ideas and information with each other.

I worked with the Awards Committee to develop new student chapter awards to be given annually in four categories. The awards were approved by the EC and I announced the new program in my President's Report in the November–December 2016 issue of the *AWM Newsletter*. Nominations are due in the spring of each year and chapters can self-nominate. The categories and winners for 2017 were:

- Community Outreach: University of North Carolina.
- Fundraising and Sustainability: University of Texas at Arlington.
- Professional Development: Youngstown State University.
- Scientific Excellence: Brown University.

The awards are typically presented each summer at a reception at MathFest.

As described above, I invited student chapters to join the AWM Hill visits, and published pictures and articles about the 2015 and 2016 visits to spread the word. We also involved the chapters in a t-shirt design contest for the 2017 Symposium and hosted a special event for student chapters there. I invited student chapter members to attend the AWM Reception at JMM to meet with Executive Committee members and network.

We also wanted to find ways to create a regional focus to bring together geographically co-located chapters. This effort is hard to scale up, but it fit nicely with our partnership with MAA sections to host AWM events at MAA section meetings. In several cases, we were able to organize poster sessions for AWM chapters and host AWM lunch tables at the section meetings. I also supported regional meetings for women where student chapters could connect.

To this day, whenever I visit a mathematics department, I ask or offer to meet with the AWM student chapter (e.g., see Figure 9). Whenever I am asked for suggestions on how to improve the culture of a department, or I am on a panel, or I host an AWM lunch at an MAA section meeting, I urge members of our community to start an AWM student chapter or be a faculty advisor to a chapter. I know several examples where the AWM student chapter has significantly improved the overall environment for students and even faculty in a department.

Fig. 9 Visiting the AWM student chapter at Texas A&M University, spring 2017



Social Media

AWM launched a Facebook page while Jill Pipher was president. With the world of social media rushing by us, there was some awareness at the January 2015 EC meeting that with our new Web Editor, Adriana Salerno, AWM could do more to coordinate its web and media presence. I proposed the formation of an ad hoc Media Committee and it was approved by the EC. The short-term goals of the committee were to improve communication with our members, to reach and attract new members, to raise the profile and awareness of AWM in the mathematics community and in the public, to attract media attention for our events, and to attract more corporate sponsors for the organization and for our initiatives. The Media Committee was chaired by Web Editor Adriana Salerno, with members Anna Haensch, Marie

Vitulli, Talitha Washington, Newsletter Editor and Associate Editor Anne Leggett and Sarah Greenwald, Executive Director Magnhild Lien, and myself.

One of the first actions of the new committee was to launch the AWM Twitter feed, @AWMmath, thanks to Anna. The committee also helped to refine the AWM Symposium poster and the new AWM “Catch the Wave” t-shirt, both designed on a volunteer basis by my daughters. The t-shirts were sold at the Symposium and MathFest. We reached out to media outlets to generate positive press for the Symposium. I even invited First Lady Michelle Obama to be the Keynote Speaker at our Symposium Banquet! She declined, oh well!

In a series of almost daily posts on the AWM Facebook page, EC and Media Committee member Marie Vitulli provided stimulating topics for discussion, interspersed with biographies of women in mathematics and updates on the activities of AWM and women in the profession. This high-quality content attracted many followers, more than 5,000 during my term. We were able to sell some paid advertisements to help support AWM. As of 2020, the AWM Facebook page has more than 10,000 followers. Marie later became the AWM Media Coordinator and chaired the committee. The AWM Twitter feed now has more than 4,000 followers, and I still retweet relevant content for the AWM Twitter feed on a daily basis.

Sponsorship and Fundraising

I often shock my math colleagues by saying “it’s all about the money,” in the sense that access to opportunity to excel in scientific research is gated by access to resources to support that work. Unfortunately, most of the money from private and public sources which supports the mathematics research community *does not go to women*. As president, I worked hard to recruit new corporate sponsors for AWM to help support our mission. Fortunately we have had support from Microsoft for the last 10 years, both to donate my time to AWM leadership, and to direct funds from my external funding budget at Microsoft Research to support AWM. Microsoft Research has been a corporate sponsor for all five AWM Research Symposia, and for the WIN conferences and numerous other RCCWs at IMA, IPAM, and ICERM, and for the follow-up Summer Research in Mathematics Program at MSRI. I was also able to use my budget at Microsoft to fund the AWM Research Prize in Number Theory and Algebra in 2012. It turned out to be harder to get corporate support from other high-tech companies.

In 2014, AWM launched a new Corporate Membership and Sponsorship category, to encourage support for our mission from industry and government, and to form stronger connections with these organizations to improve and expand jobs opportunities for women in the mathematical sciences. While organizing the 2015 AWM Research Symposium, Magnhild Lien and I were able to recruit new Corporate Sponsorships from INTECH and Elsevier, and new Symposium sponsors, including Springer, Google, and Wolfram, in addition to Microsoft Research and the University of Maryland.

The AWM Research Symposium is a good opportunity to attract sponsorship due to the high-quality program of special sessions, the high-profile plenary speakers, and the large number of attendees. Sponsors at the silver level and above were offered booth space. Government agencies supporting the Symposium through grants or purchasing booth space were given the opportunity to have a representative on the jobs panel at the Networking Event along with corporate sponsors, to talk about rewarding career paths in mathematics in industry and government. Wolfram provided financial support and in-kind product donations, offering free copies of Mathematica to the winners of the Wolfram Poster Contest. A corporate sponsor, Expil, became an Executive Sponsor for AWM Student Chapters in October 2015. Sponsors and exhibitors for the 2017 Research Symposium included Microsoft Research, Springer, Oxford University Press, Basic Books, AMS, and MSRI.

In addition to Corporate Sponsorships, we launched a new Fundraising Committee and a Financial Oversight Committee to invest AWM’s reserves, each with four members including the president and the executive director. In 2014, Ruth Charney and Magnhild Lien launched an extremely successful annual fundraising campaign, thanks in large part to the \$5,000 matching gift provided by an anonymous donor and to the generous contributions from the membership. In 2015, we launched a new AWM Advisory Board and Past Presidents Matching Fund. The Fund raised \$5,800, and those funds were matched!

The Genius of Recognition: Awards

The Importance of Pictures and Awards

Even before I heard a version of the definition of “genius” which involves celebrity, I knew that one of the biggest barriers to the advancement of women in mathematics and science is a lack of recognition of the vast talent, contributions, presence, and hard work of women in the field. So I was determined to shine the light on those women and their contributions, using several approaches: by increasing the number of pictures of women in mathematics in publications and on social media (e.g., see Figure 10), by creating and giving awards at AWM events, and by calling out by name all the many women mathematicians and AWM volunteers for their specific achievements and contributions in all of my President's Reports.

Fig. 10 Seven AWM presidents in a row at the AWM Reception, JMM, January 2016: Ami Radunskaya, Kristin Lauter, Ruth Charney, Jill Pipher, Georgia Benkart, Cathy Kessel, Sylvia Wiegand



I met young girls at the Canada/USA Mathcamp 2015 who told me that they decided to attend the camp because they saw pictures of other girls like them at the camp which helped them envision themselves there. So we make sure to include a color picture on the first page of the AWM Springer series volumes for every conference for women, and flood our social media channels and the *Newsletter* with pictures of women and girls doing math.

I heard from faculty members that the Alice T. Schafer Award has been a very useful tool for helping women get admitted to graduate school. I reasoned that a similar award for PhD dissertations should help women get postdoctoral positions, and so we created the AWM Dissertation Awards: conceived by Rhonda Hughes in the Awards Committee, and approved by the EC in January, 2016.

I also started many of my President's Reports with reflections on the past AWM presidents who inspired me: Jill Pipher, who kept me from dropping out of math as my first-year honors calculus teacher at the University of Chicago; Ruth Charney, with whom I worked closely as president-elect; Cora Sadosky, who inspired me as a young professional; Barbara Keyfitz, who helped us launch WIN when she was director of the Fields Institute; Georgia Benkart, who invited me to organize the AWM 40th Anniversary Conference with her and Jill Pipher in 2011; and Rhonda Hughes and Sylvia Bozeman, when we awarded them the inaugural AWM Presidential Award for founding EDGE.

It is important to celebrate our heroes, who inspire us and enable our success, so that their celebrity can raise the profile of women in the field to help break the vicious cycle of “the genius myth.” It is for that reason that I worked so hard to launch the AWM Fellows program, which was formally approved by the Executive Committee at the end of my term, in January 2017.

AWM Scientific Advisory Committee

In order to help to ensure that outstanding work by women in mathematics is also recognized through prizes, Fellow nominations, and named lectures of other societies, the AWM Executive Committee voted in January 2015 to approve a proposal from the Awards Committee to establish the AWM Scientific Advisory Committee. One of my first tasks when I took over as president was to launch this committee and recruit members. The committee was to consist of six members serving staggered three-year terms charged with generating names of potential nominees and procuring nominations for women to be recipients of distinguished prizes, awards, and honors of organizations related to the mathematical sciences, including SIAM, AMS, MAA, and AWM.

In the previous two years, Ruth Charney, in her role as AWM president, helped to generate nominations for many women to become AMS and SIAM Fellows. Awards Committee Chair Sylvia Wiegand was active in generating names and in proposing the establishment of the new Scientific Advisory Committee (SAC). So I was delighted when Ruth and Sylvia agreed to serve on the new committee to help launch it and ensure its success, with Ruth as chair for the first year. The other inaugural members were Georgia Benkart, Sunčica Čanić, Barbara Keyfitz, and Susan Montgomery. I worked closely with the SAC while I was president, and together we were able to generate numerous nominations for highly deserving women, for AMS and SIAM Fellow recognition especially. We also enjoyed working together and I learned a tremendous amount from Ruth as I worked with her as president-elect.

AWM Fellows Program

Ruth Charney had launched the AWM Scientific Advisory Committee to nominate many deserving women for awards, and yet it was clear to me that there was still a gap and a role for AWM to play. To return to the theme of Kaplan's book, *The Genius of Women*, there are so many talented women mathematicians and educators whose work is not sufficiently celebrated, recognized, and supported. The Fellows programs of other professional societies aim to help their members achieve recognition from their universities and communities for their outstanding work. So I felt strongly that AWM needed to have a Fellows program to recognize the "Genius" of a large class of women in mathematics, and that the Fellows program would help advance the AWM mission.

Although the Fellows program was originally proposed by past presidents Rhonda Hughes and Sylvia Wiegand when Sylvia was chair of the Awards Committee, the proposal did not win approval from the Executive Committee the first time. It took several years, a few iterations, and a lot of hard work from the Awards Committee to refine, define, and launch the AWM Fellows program. I appointed Joan Ferrini-Mundy to chair the Awards Committee in 2016 and she was able to steer the approval process to a successful conclusion. At the end of my term, in January 2017, the AWM Fellows program was approved. Carol Woodward then took over as chair of the Awards Committee and brought her experience on defining the Fellows program for SIAM. It took another year for the committee to define the specifics and launch AWM's program, and the inaugural class was announced and celebrated at the AWM reception at JMM in January 2018.

In the first few years of the program, I have led an effort to coordinate the other AWM past presidents to nominate many deserving people for AWM Fellow. I am thrilled that our AWM Fellows Program gives a way to recognize all the hard work and leadership to support women in math. Many of our other prizes and awards are aimed at the early-career stage: the dissertation prizes, the research prizes, student chapter awards, and poster prizes at workshops. The AWM Fellows Program recognizes sustained commitment to advancing women in mathematics. Part of the genius of *Women* is helping each other: the Fellows designation gives us a way to recognize and assign value to that work!

Conclusion

In February 2017, when I started my new life as past president of AWM, it was bittersweet. Some might say it is crazy to take on an extra, roughly half-time, unpaid job for two years in addition to a full-time research career, management, and family (yes, it is!), but serving as president of AWM was also absolutely the best (and most rewarding) thing I have done in my professional career (OK, maybe besides starting WIN with Rachel and Renate).

My primary goal going into my term as president was to build community and support for women in research mathematics, in all three sectors, industry, government, and academia, primarily through the Research Networks initiative modelled on WIN and to obtain support for it through the AWM NSF ADVANCE Grant. But along the way, I found myself inspired by other initiatives to help students and girls to advance, and became a devotee of the AWM mission “to advance women and girls in the mathematical sciences.” It was an amazing journey, but now I am proud to look back at the many things we learned and accomplished together with Executive Director Magnhild Lien, the AWM Executive Committee, Ruth Charney and Ami Radunskaya, my predecessor and successor as president, and the roughly 200 AWM volunteers serving on all of our committees.

My service to AWM and the mathematics community had a profound impact on me and my leadership style. The experience helped me to find my voice, and I started to speak up clearly and forcefully in leadership team meetings even when I was the only woman in the room or in the 10% minority. I now feel empowered to speak on behalf of the cause of promoting and supporting women and other diverse and underrepresented groups. In fact, I feel a *responsibility* to speak on our behalf. And I find that when I do so politely, respectfully, and succinctly I often get a very positive response.

It is still my mission to transform our society by training and advancing women leaders, in science, industry, and government, to achieve 50% representation. Imagine a world where women are represented 50–50 in the Senate and House, the White House, the leadership of Microsoft, and all other companies and levels of government. Imagine how women could lead society through change by improving science communication and engaging the public in discussing and implementing policy change to solve important societal problems. Imagine that every leadership meeting includes 50% women, with women empowered to offer and discuss ideas in equal measure to men.

So in conclusion, I believe that “the Genius of AWM” is one part building community for women and other marginalized minorities in the profession, one part changing the structures that hold women back through advocacy, and one part recognizing and celebrating “The Genius of Women” in mathematics! Clearly, we need to continue our work in all these directions!

I urge everyone to get involved in AWM and to become a member. Helping other women is inspiring and energizing (a rising tide lifts all boats). Anyone can help start, join, or support an AWM chapter or a Research Network for women. Anyone can attend an AWM workshop or symposium. Other ways to get involved include being a mentor, getting a mentor, and publishing in AWM publications! Happy 50th Anniversary to the AWM!

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References

- AMS. 2015. Statistics on women mathematicians, compiled by the AMS. *Notices of the American Mathematical Society* 62(9): 1055.
- Benkart, Georgia, Kristin Lauter, and Sylvia Wigand. 2021. AWM at 50 and Beyond. *Notices of the American Mathematical Society* 68(3): 387–397.
- Haensch, Anna and Adriana Salerno. A live blog about the 2015 AWM Research Symposium. <https://awmsymposium2015.wordpress.com/>. Accessed 15 Dec 2020.
- Hayes, Brian. 2002. Science on the farther shore. *American Scientist* 90(6): 499–502.
- Leslie, Sarah-Jane, Andrei Cimpian, Meredith Meyer, and Edward Freeland. 2015. Expectations of brilliance underlie gender distributions across academic disciplines. *Science* 347(6219): 262–265.
- O’Neil, Cathy. 2015. Representation of women and the genius myth. *mathbabe* (blog). <https://mathbabe.org/2015/01/16/representation-of-women-and-the-genius-myth/>.
- Topaz, Chad and Shilad Sen. 2016. Gender representation on journal editorial boards in the mathematical sciences. *PLoS ONE* 11(8): e0161357.