Closing the Gender Gap in Patenting, Innovation, and Commercialization

Programs Promoting Equity and Inclusion

INSTITUTE FOR WOMEN'S POLICY RESEARCH

About This Report

This report profiles programs designed to increase gender diversity in patenting, innovation, and entrepreneurship in a variety of settings, including academic institutions, corporations, and government and nonprofit organizations. Drawing on a program scan and interviews of selected program leaders and participants, it describes seven programs in depth and highlights how they were developed, their successes and lessons learned, and their results in promoting gender diversity. The report aims to provide an accessible resource that can help others seeking to increase the number of women who patent and commercialize their inventions. It is one of a series of IWPR research reports examining the underrepresentation of women, including women of color, among patent holders and in science, technology, engineering, and mathematics (STEM) disciplines and occupations. The report was produced with support from Qualcomm, Inc.

About the Institute for Women's Policy Research

The Institute for Women's Policy Research (IWPR) conducts and communicates research to inspire public dialogue, shape policy, and improve the lives and opportunities of women of diverse backgrounds, circumstances, and experiences. The Institute's research strives to give voice to the needs of women from diverse ethnic and racial backgrounds across the income spectrum and to ensure that their perspectives enter the public debate on ending discrimination and inequality, improving opportunity, and increasing economic security for women and families. The Institute works with policymakers, scholars, and public interest groups to design, execute, and disseminate research and to build a diverse network of individuals and organizations that conduct and use women-oriented policy research. IWPR's work is supported by foundation grants, government grants and contracts, donations from individuals, and contributions from organizations and corporations. IWPR is a 501(c)(3) tax-exempt organization that also works in affiliation with the Program on Gender Analysis in Economics at American University.

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Closing the Gender Gap in Patenting, Innovation, and Commercialization:
Programs Promoting Equity and Inclusion

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Executive Summary

Greater diversity of perspectives among inventors and entrepreneurs can speed progress in addressing society's most serious problems. Women and many communities of color, however, remain significantly underrepresented within the innovation ecosystem in the United States. Recent research indicates that women are less likely than men to enter into and advance in the fields of science, technology, engineering, and mathematics, and less likely to patent and commercialize their inventions when they do. As of 2010, only 18.8 percent of all patents granted had at least one woman inventor listed.

A number of programs across the nation are addressing the gender gap in patenting, innovation, and commercialization. This report describes some of these efforts, based on a scan of programs and in-depth interviews with leaders of notable programs across the country. IWPR queried dozens of experts to identify promising programs, and conducted interviews with program leaders and participants to identify and profile a subset of seven programs selected according to criteria related to program longevity, outcomes tracking, and other factors.

Featured Programs

The programs profiled in this report were all created to address female underrepresentation in innovation. They operate in different settings (e.g., universities, nonprofit organizations, corporations), target different audiences (e.g., professional women, women faculty, women patent holders), and often tailor their approaches to address specific challenges or issues experienced in their communities. The programs engage in a variety of activities, such as helping participants broaden their networks or obtain funding, connecting them to mentors, offering women individual guidance to help them advance in the patenting or commercialization process, and educating the broader community on the importance of increasing diversity in patenting, innovation, and commercialization. The seven programs selected for in-depth interviews are listed below.

1. **Accelerating Women And underRepresented Entrepreneurs (AWARE)** program is located at the University of Illinois Urbana-Champaign. AWARE is a program for faculty and graduate students who are interested in patenting and commercializing their innovations. The program hosts seminars and networking events at the University to connect participants with mentors and investors and also employs an Entrepreneur in Residence (EIR) who works one-on-one with participants to guide them through the patenting and commercialization process. The program also provides small proof of concept and/or seed grants to participants.

2. **BioSTL's Bioscience & Entrepreneurship Inclusion Initiative** works to increase diversity in the bioscience technology industry in the greater St. Louis region. The Inclusion Initiative partners with other organizations and companies to host seminars and workshops in addition to working one-on-one with innovators to connect them with resources and individuals to help them commercialize their innovations.

3. **Empowering Women In Technology Startups (EWITS®)** is a 10-week program offered at the University of Florida. It is a hands-on experiential learning program focused on helping professional women understand the process of commercializing an invention. The women in the program are split into teams and asked to develop a business model for a real technology (not their own) and develop the elements of a company to commercialize the innovation.

4. **MyStartupXX** is a student accelerator program run out of the Rady School of Management at the University of California San Diego. This semester-long program supports innovators who are

working to commercialize an invention and helps them build a business plan, develop a pitch plan for investors, and develop a working prototype of their invention.

5. **REACH for Commercialization™** works with female faculty, postdoctoral researchers, and graduate students at Ohio State University. The program runs a series of four workshops that discuss different aspects of the patenting and commercialization process in an academic setting. REACH also hosts networking events that help connect their participants with investors, entrepreneurs, and peers.

6. The U.S. Department of Energy's (DOE) Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) **Phase 0 Assistance Program** strives to increase diversity in DOE SBIR/STTR programs by helping women- and minority-owned small businesses field competitive applications for DOE SBIR/STTR Phase I awards. The program works one-on-one with participants, helping them develop their applications and connecting them with business mentors and industry experts who provide assistance on a range of topics.

7. **STEM to Market** is a two-part program run by the Association for Women in Science with cohorts based in three locations: Washington, DC; Chicago, Illinois; and the San Francisco Bay Area. The program provides entrepreneurial training and support to women working in science, technology, engineering, and math (STEM) fields, and works with key decision makers, investors, and funders to increase innovation and entrepreneurship among diverse groups of women through systems change.

The programs receive funding from an array of sources including the federal government, universities, and private foundations. Many have no dedicated staff or are run by one staff member; some rely on volunteers who donate their time and expertise.

Strategies for Promoting Women's Participation and Success in Patenting, Innovation, and Commercialization

Though each program has taken a different approach, some common strategies for increasing women's patenting, commercialization, and entrepreneurship emerged across the interviews.

- **Information-sharing and education**
  Education about patenting and commercialization is a significant component of programs profiled for this report. Educational activities and resources were provided in a variety of ways, including through a structured curriculum, one-on-one advice, and seminar-based instruction. A majority of the program leaders interviewed said that women in their communities are less likely than men to hear about the possibilities and benefits of pursuing patenting and entrepreneurship, and that women are less likely to view these activities as an achievable part of their career paths.

- **Network building and mentorship**
  All the programs profiled seek to help women cultivate the networks and sponsors needed to take an innovation from idea to market. Each program stresses the importance of networking among peers, which allows participants to learn from others' challenges, troubleshoot their own issues, and receive advice. In addition, the programs help participants network and develop connections with investors and venture capital firms who might assist them in securing funding. They use a variety of strategies to help women build networks, including hosting symposiums and

workshops, bringing experts into the program, and connecting innovators to mentors.

- **Changing the culture**
  The programs featured in this report actively work to foster cultural change by building awareness about the importance of diversity in patenting, commercialization, and entrepreneurship across a broad set of audiences, including students, faculty, and staff at universities; stakeholders in local communities; and investors. For example, BioSTL's Inclusion Initiative works with partner organizations and institutions to change the culture of the bioscience industry in St. Louis, and STEM to Market offers tools and interventions to help investors develop more inclusive policies and practices.

- **Tracking outcomes**
  Each program either formally or informally tracks its outcomes, and all measure their program's success at achieving concrete program goals. For example, EWITS® and REACH survey their participants to track experiences and outcomes, and EWITS® was evaluated by a Ph.D. student for their dissertation. Other programs have collected stories and anecdotes from participants to illustrate their program impacts for individual women.

Suggestions for Program Development and Support Based on Leader Interviews

The report offers insights on strategies for effective program development and implementation derived from the program leader interviews. In conceiving and planning their programs, for example, leaders said they spent considerable time and energy identifying and understanding their target audience and the kinds of partnerships and resources that would best serve them. Program leaders stressed the importance of defining a realistic scope of work by identifying key gaps in existing supports, working with other programs in the community, and avoiding duplication of other efforts.

The program leaders interviewed also emphasized the importance of ensuring stakeholder buy-in—such as from university leadership for programs in university settings—and establishing relationships with partners and other organizations within local communities. Such relationships help to ensure that the program receives ongoing support, both financial and otherwise, and connects program leaders to individuals and networks needed to run each program. Data on outcomes and feedback from participants can help programs garner support from stakeholders and enable them to make course corrections over time, continuously increasing their effectiveness.

The programs featured in the report often struggle to secure adequate funding to fully meet their programmatic goals. Almost all expressed a desire for additional staffing that they could not currently afford. The sustainability and scalability of programs, like the ones profiled in this report, would require greater investments from philanthropists, corporations, and other stakeholders to allow programs to compensate their leadership and expert participants for their time and efforts.

Rigorous external program evaluations, potentially comparing different approaches, could help ensure that organizations and supporters are investing in efforts that will make a measurable difference in closing the gender gap in patenting, innovation, and commercialization.

When asked how greater diversity would affect women and society, those interviewed for this study responded unequivocally: it would make the world a better place. Increasing diversity in inventing and entrepreneurship would help ensure that innovation addresses a more diverse set of challenges and that higher quality products and services are developed to tackle society's pressing issues.

Introduction

As the world continues to face new and diverse challenges, it will take cutting edge innovations to find solutions to ensure that society progresses and flourishes. The pressing issues of the day—including climate change, food insecurity, disease outbreaks, and cybersecurity challenges, among many others—create an urgent need for innovative solutions such as alternative energy sources and new systems, goods, and services that improve quality of life. Developing viable innovative solutions to these complex and multidimensional challenges will require diverse, innovative approaches that promote prosperity, equity, and well-being in the decades to come. The world of inventors and entrepreneurs who commercialize intellectual property, however, still includes relatively few women and people of color (Williams-Baron, Milli, and Gault 2018). Women are less likely than men to enter and advance in the fields of science, technology, engineering, and mathematics (STEM) (Beede at al 2011; Hess et al 2015), and less likely to patent their inventions when they do. In 2010, only 18.8 percent of all patents granted had at least one woman inventor listed (Milli et al. 2016).

A number of programs across the country are addressing the gender gap in patenting, innovation, and commercialization. This report describes some of these efforts. Based on a program scan and phone interviews with 15 program leaders from 7 programs, this report is designed to provide an accessible resource for those interested in interventions to increase the number of women who patent.

As a part of its interviews, IWPR asked program leaders what impact it would have, on women and society, if we increased diversity among innovators. Those interviewed responded unequivocally: it would make the world a better place. Increasing diversity in innovation and entrepreneurship would help ensure that innovators address a diverse set of challenges and develop new products and services to tackle the pressing issues facing society today.

Overview of Women in Innovation, Patenting, and Entrepreneurship

Though the number of patents that include at least one woman inventor has increased significantly over time, women remain sorely underrepresented in patenting. One study that analyzed data on information technology (IT) patents granted by the US Patent and Trademark Office (USPTO) found that in 2013, women were only 10.8 percent of all inventors on patents for whom gender was able to be determined (Sugimoto et al. 2015). When looking at IT patents granted by the USPTO with a woman listed as the first inventor, the gender gap is even larger: between 1980 and 2010, women were the first inventor on just 5.6 percent of patents (Ashcraft and Breitzman 2012). IWPR has projected that at recent rates of change, women will not see parity in patenting until 2092 (Milli et al. 2016).[1] Women are also less likely than men to be represented on STEM-related patents (Milli et al. 2016).

Women's underrepresentation in STEM fields is one factor contributing to the gender gap in patenting: while women make up nearly half of the U.S. workforce, they only account for 29 percent of the STEM workforce (Hess et al. 2015). Black, Hispanic, and Native American women have especially low levels of representation in STEM. Only 2.8 percent of Black working women, and 2.3 percent of both Native American and Hispanic working women are employed in STEM fields, compared with 11.3 percent of Asian/Pacific Islander women and 4.9 percent of White women (Hess et al. 2015). Women of color are also vastly underrepresented in the STEM professoriate: just 5.7 percent of those with STEM doctorates who are assistant, associate, or full professors are women of color (Hess, Gault, and Yi 2013).

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[1] This means that by 2092 half of all patents will have at least one woman inventor listed, not that half of all inventors listed on patents will be women.

Research indicates that women face numerous obstacles to entering and advancing in STEM fields (Hill, Corbett, and Rose 2010) and engaging in patenting and commercialization (Rosser 2012). Women in STEM fields face gender discrimination (Moss-Racusin et al. 2012) and stereotypes that portray them as lacking the qualities needed to be successful scientists (Carli et al. 2016). In addition, women often experience work-family conflict stemming from caregiving responsibilities that may interfere with their STEM academic careers (Fox, Fonseca, and Bao 2011). While increasing women's participation in STEM—especially patent-intensive STEM fields like engineering—would likely help close some of the gender gap in patenting (Cook and Kongcharoen 2010; Hunt et al. 2012), women who succeed in STEM may still face additional obstacles to the patenting process. Obtaining a patent can be expensive (Quinn 2015), and the costs can be disproportionately prohibitive to women, since they tend to earn less than men (Hegewisch and Williams-Baron 2018) and have less access to capital when they start businesses (Milli et al. 2016), which can make it difficult for them to cover expenses like hiring a patent attorney.

A number of programs across the United States are addressing the lack of gender and racial diversity in patenting, innovation, and commercialization, and this report profiles several notable examples. The report describes seven programs and includes information on how they were developed; their structures, strategies, and lessons learned; and where possible, their results in promoting gender diversity in innovation.

Methodology

Program Scan

To identify programs working to close the gender gap in patenting and innovation, IWPR conducted an online search and solicited suggestions from roughly 75 experts who had been invited to attend the *Diversity in Patenting: Developing a Research Agenda to Tap into America's Underutilized Potential* workshop, hosted by IWPR in May 2017 in Washington, DC. Based on the results of this search and the suggestions received, the IWPR research team compiled a list of 55 programs that are actively engaged in promoting women in patenting and entrepreneurship.[2]

Through online research and phone calls, IWPR examined and recorded the characteristics and activities of these programs, which operated in different settings (e.g. universities, government, and nonprofit organizations) and served different audiences (e.g. professional women, women faculty, women-led innovation teams, women patent holders). Many offered initiatives with educational components, such as formal, structured classroom-based curricula, educational seminars, or workshops that covered a range of topics. The programs engaged in a wide variety of activities, including helping participants broaden their networks or obtain funding, connecting them to mentors, running a competition or giving an award, providing individual guidance to help women advance in the patenting or commercialization processes, and educating the broader community on the importance of increasing diversity in patenting, innovation, and commercialization.

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[2] IWPR also identified 29 companies with headquarters in the United States that were listed as having the highest proportion of women inventors in the 2016 World Intellectual Property Organization (WIPO) report (Martínez, Raffo, and Saito 2016). The researchers had difficulty reaching the appropriate individuals at these companies, and only heard back from three, so did not include corporate efforts among the seven programs featured in the report. For more information on corporate efforts, please see Appendix A.

Program Selection for Interviews

To determine which programs to consider for inclusion in the report, IWPR developed a list of selection criteria, including:

- Being actively focused on addressing the gender gap in patenting and/or innovation among U.S. adults

- Being in operation at the time of study

- Having received recognition from others as doing something innovative or exemplary to address the gender gap in patenting and innovation

- Having data on the program's outcomes or a way to measure or assess its impact (desired, not required)

- Having been in existence for more than a year (desired, not required).

IWPR also sought a mix of programs that focus on issues at different stages of the innovation cycle, work in different settings, and use different models (where possible, IWPR avoided including multiple programs using the same model). In addition, IWPR looked for programs located in different regions and that used a variety of approaches.

IWPR reached out to a majority of the programs via e-mail and phone and conducted preliminary phone calls with a representative from each of the 17 that responded. From these calls, IWPR identified seven that met the selection criteria and represented a range of program models:

1. Accelerating Women And underRepresented Entrepreneurs (AWARE), University of Illinois Urbana-Champaign

2. Bioscience & Entrepreneurship Inclusion Initiative, BioSTL, St. Louis, MO

3. Empowering Women In Technology Startups (EWITS®), University of Florida

4. MyStartupXX, University of California San Diego

5. REACH for Commercialization™, Ohio State University

6. SBIR/STTR Phase 0 Assistance Program, U.S. Department of Energy

7. STEM to Market, Association for Women in Science, Washington, DC; Chicago, IL; and the San Francisco Bay Area, CA.

A few programs that participated in preliminary phone calls are not featured in this report because they replicated the model of another program chosen to be profiled. Information about several other innovative programs that emerged in our search process, but did not meet the criteria for a full profile, are described in Appendix A.

Program Interviews

IWPR conducted in-depth phone interviews with leaders of the seven selected programs to learn more about their program development activities, day-to-day operations, resource availability, results and outcomes, and future goals (see Appendix B for the interview protocol). Interviews lasted from an hour

and a half to two hours. Five of the programs sent data on participant demographics and outcomes to IWPR. Where possible, the programs also put IWPR in touch with current and/or past program participants; IWPR conducted 30-minute phone calls with six participants representing four programs. In addition, IWPR obtained quotes from current and/or past participants from program evaluation materials for two programs. The interviews were analyzed for common themes and used to inform each program profile for the report.

Program Development and Design

Each of the programs was developed to address female underrepresentation in innovation. As one individual interviewed put it, the patenting, innovation, and commercialization sphere was "very male and pale." Each program began with a unique "aha" moment that drove its leaders to look more deeply at the gender and racial dynamics within their community and identify the challenges and issues that needed to be addressed. For example, the Empowering Women in Technology Startups (EWITS®) founders noticed that a new University of Florida business incubator did not have any female CEOs represented within the first cohort of companies. At the University of Illinois, the AWARE program founders observed that although the Office of Technology Management (OTM) was women-led, the majority of people utilizing their services were White men. After watching *The Social Network* together as a group and wondering why no women were a part of launching Facebook—especially when building social networks is traditionally seen as a stereotypically female activity—the team at the Rady School of Management at the University of California San Diego (UCSD) looked into the dynamics at their own school and noticed that female students were much less likely to have leadership roles, if any, on the innovation teams taking part in UCSD innovation competitions or the accelerator programs for students.[3] The Association of Women in Science (AWIS) noticed that many accelerator programs still struggled to recruit and retain women of color in STEM, which led them to look deeper into why traditional program models were not working for diverse groups of women.

Each program took a unique approach to developing their model and identifying their target audience.

- **Building Relationships to Address Inequality**
  The development of the AWARE program came at a time when the University of Illinois had been making a concerted effort to increase the diversity of its faculty, especially in the college of science and engineering. Though the number of women STEM faculty had been rising, their engagement with the tech transfer office or commercialization process had not increased. To address this problem while avoiding replication of existing initiatives, AWARE took note of the other programs at the University and in the surrounding area and developed its own model that makes relationship building, networking, and mentoring the central focus. AWARE hosts seminars and networking events at the University to connect participants with mentors and investors and also employs an Entrepreneur in Residence (EIR) who works one-on-one with participants to help them through the patenting and commercialization process.

- **Building Networks to Change an Ecosystem**
  BioSTL works as a regional convener, investor, and catalyst that has helped develop the bioscience technology industry in the greater St. Louis region. After noticing that the individuals dominating this developing technology startup space were White men, BioSTL officially made

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[3] Accelerator programs support early-stage companies through education, mentorship, networking, and financing. Many use a cohort model and run for a fixed period of time, and participants usually come away with a pitch presentation to help "accelerate" their growth.

increasing diversity and inclusion central to its programming, starting in 2008. BioSTL's approach stemmed from their position as a regional convener within the bioscience ecosystem; they focused their inclusion work at the system level, capitalizing on the relationships they had already established with regional partners and programs. The Inclusion Initiative hosts events and trainings in partnership with other local organizations and companies and works one-on-one with inventors and entrepreneurs, connecting these individuals to the resources and partners they need to successfully commercialize their innovations.

- **Creating a Dedicated Space for Women**
  The EWITS® team focuses on creating a space where professional women can learn about entrepreneurship and technology-based commercialization and also have a safe environment where they can address the specific challenges of being a woman in male-dominated fields. The program brings women innovators together to work together under the guidance of an experienced female entrepreneur, where they are able to work closely and learn with other female innovators and women who have experience with the patenting and commercialization process and the challenges that women face during that process.

- **Accelerating Change through Young Women Leaders**
  The MyStartupXX team, which is based within the Rady School of Management at the University of California San Diego, focuses on students. The program leaders believe that getting women to think about innovation and entrepreneurship at younger ages will make the greatest impact on increasing gender diversity in innovation, patenting, and commercialization. The program takes student innovators who are working to launch a company and helps guide and assist them on their patenting and commercialization journey. While the program is open to all students at the University, each innovation team must have a woman in a prominent leadership position (either as CEO or another equally prominent role on the team).

- **Pairing Education and Network Building to Bring Research to Practice**
  REACH for Commercialization's approach focuses on structured programming for women faculty and postdoctoral researchers that balances educational components with an emphasis on building networks and relationships with mentors. The program includes a series of interactive workshops designed to cover topics essential to the commercialization process, expose participants to the experiences of women who have patented and commercialized their inventions, and give participants the space to discuss challenges they face in doing so.

- **Providing One-On-One Support to Help Build Competitive R&D Grant Applications**
  The U.S. Department of Energy's (DOE) Phase 0 Assistance program was developed to increase diversity in the DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs by helping women- and minority-owned small businesses that have never won a DOE SBIR/STTR Phase I award[4] put together a competitive application. The program works individually with participants on their applications and connects them with business mentors and industry experts who provide one-on-one advice and assistance.

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[4] A Phase I SBIR/STTR award provides up to either $150,000 or $225,000 (depending on the technology topic) that can be used to explore the feasibility of an innovative concept, including the development of a prototype and work on refining the proof of concept for an innovation (U.S. Department of Energy 2018).

- **Offering Online Resources to Women of Color in STEM While Addressing Investor Bias** STEM to Market's model came out of the more than eight years of research done by AWIS on the underrepresentation of STEM women in entrepreneurship. Much of STEM to Market's work uses an intersectional framework that focuses on increasing the share of women of color in STEM. AWIS's research has also led its program leaders to believe that training women alone will not mitigate the systemic issues women face. This insight contributed to STEM to Market's two-pronged approach: an Accelerator side focuses on providing a virtual program model with a holistic approach as a means of both attracting and retaining STEM women of color, while an Intentional Investing side engages with investors and funders within the STEM-based startup world and provides them with tools to mitigate bias in their funding processes.

Funding and Staffing

The featured programs receive their funding from the federal government and/or from private foundations. Many have no dedicated full-time staff or are run by only one full-time staff member; some rely heavily on volunteers who donate their time and expertise. Some programs have kept their costs low through their relationships with Universities that may provide monetary support or donate space, staff time, and materials to help ensure these programs can continue operating.

Strategies for Promoting Women's Participation and Success in Patenting, Innovation, and Commercialization

Information-Sharing and Education

A number of program leaders interviewed noted that the women they served had received little information or education to equip them to pursue patenting and entrepreneurship and did not see commercialization of innovation as a part of their career paths. To address this gap, many of the programs place a major emphasis on education about patenting and commercialization, whether in the form of a structured curriculum, one-on-one advice, or seminar-based instruction. Some programs – EWITS®, MyStartupXX, and AWARE – focus more on giving a broad education across a range of topics, while others provide a more individually tailored educational component. Two programs—REACH for Commercialization™ and STEM to Market—incorporate both approaches.

Network Building and Mentorship

One common theme that surfaced in the interviews was that many women lack the networks and sponsors needed to take an innovation from idea to market. In a lot of ways, the issues raised by the programs echoed the same challenges women identify when trying to break into politics for the first time: women are less likely to be connected to peer networks, to have access to mentors, and to have connections to those who can be considered "sponsors" (see Baer and Hartmann 2014).

The featured programs focus on helping participants network and develop connections with peers as well as with investors and venture capital firms who might help them secure funding. They use a variety of strategies to help women build these crucial networks, including hosting symposiums and workshops, bringing experts into the program, and connecting individual innovators to mentors.

Changing the Culture

The programs highlighted in this report strive to foster broader cultural change in patenting, innovation, and entrepreneurship through awareness-raising campaigns and speaking about the importance of

diversity to broader audiences, including students, faculty, and staff at universities; stakeholders in local communities; and investors. For example, one of the main components of BioSTL's Inclusion Initiative is working with partner organizations and institutions to help change the culture of the bioscience industry in St. Louis. STEM to Market strives to raise awareness among investors of gender and racial gaps and advocate for changes in the way investors think about funding and the part they play in the continued lack of diversity. The program offers tools and interventions to help investors develop more inclusive policies and practices.

Tracking Outcomes

Each program formally or informally tracks its outcomes, and all have concrete goals by which to measure their program's success. Both EWITS® and REACH survey their participants to track experiences and outcomes. EWITS® has also undergone an external evaluation by a Ph.D. student, who published the results as a part of their dissertation (Calhoun 2017). A REACH team member collects and analyzes survey data for an IRB-approved study on their program model, which are combined with commercialization metrics from the Technology Commercialization Office. STEM to Market completed a report in 2018 that presents preliminary findings from the first three cohorts of the program's first year (Association for Women in Science 2018). Though MyStartUpXX does not track its own individual data, the Rady School of Management tracks data on gender diversity overall across its various accelerator programs. Phase 0 tracks its success by the number of Phase I SBIR/STTR grants awarded to the different underrepresented groups it serves. The programs that do not formally track data on outcomes have collected stories from participants that illustrate the impact of these initiatives.

Accelerating Women And underRepresented Entrepreneurs (AWARE)
University of Illinois Urbana-Champaign

Program Founding

The Accelerating Women and underRepresented Entrepreneurs (AWARE) was first envisioned in 2015 by the female-led Office of Technology Management, female-led EnterpriseWorks incubator, and leaders in the College of Engineering at the University of Illinois Research Park, and continues as a collaboration among these three entities. The AWARE program receives funding from the National Science Foundation (NSF), which used the Small Business Innovation Research (SBIR) administrative funding pilot authority to support AWARE as part of NSF's mandate to increase the participation of underrepresented small businesses in SBIR programs. The NSF grant was first awarded in 2015 and the AWARE program was officially launched in 2016.

Year Started	2016
Target Audience	University faculty & graduate students
Cohort model	No
Women Only	No
Program Model	Informal/relationship building
Program Overview	• 2 events per year • Entrepreneur in Residence • Proof of concept/Seed grants • SBIR application assistance
Educational Topics	What is a tech transfer office?; What investors are looking for; Obstacles and strategies for success for women
Funding Source(s)	National Science Foundation (government)

Though the program is targeted toward underrepresented faculty and graduate students, AWARE also works with some undergraduate students who show a desire to patent and commercialize their innovations. AWARE has spent much of their time and energy working on nuanced and targeted outreach. While participants tend to be faculty who have not yet or just recently received tenure, their age range spans from the 20s to 50s. The only requirements of the program are that participants have contributed directly to an innovation they would like to patent or commercialize, and they must be a part of an underrepresented group.

Program Design and Implementation

The AWARE program has no formal start or end date and no official curriculum. Instead, it focuses on raising awareness through educational events and giving one-on-one support to underrepresented faculty and graduate students. While eligibility for participation in the program is not restricted to women, AWARE's marketing and messaging indicate that the program's main goal is to get more women into commercialization. About 90 percent of AWARE's resources have gone to underrepresented women.

AWARE usually hosts two formal programs per semester, which consist of luncheons, panel events, or workshops that feature female experts who discuss topics ranging from what "technology transfer" is to funding, venture capital, and what venture capitalists (VCs) are looking for when they fund a project. The topics for these educational events depend on the availability of speakers, but all give attendees insight into patenting, commercialization, and entrepreneurship, as well as challenges the speakers have faced

and their successes. In addition to the two formal programs, AWARE has also been able to provide small proof of concept or seed grants to 14 individuals or teams in the past two years. However, due to constraints on what the money can be used for, many participants have not been able to make use of the funds.

AWARE has made relationship building the central component of their program and worked not to reproduce or replicate other programs at the University of Illinois. While AWARE's workshops and events contain educational components, they also provide participants with the opportunity to meet peers and other experts, entrepreneurs, and investors. An Entrepreneur in Residence (EIR) also helps participants build their networks. The EIR is a paid staff member who works directly with the AWARE participants, acting as a mentor and coach to help them navigate the challenges that underrepresented groups face when working to commercialize their innovations and connect with key resources.

For faculty working on Small Business Innovation Research (SBIR) grant applications, AWARE contracts with experts to provide technical assistance. To access this service, participants must have gone through the SBIR training offered at the University, met with the EIR, and previously attended AWARE programming. The individuals who provide SBIR technical assistance work one-on-one with individuals, helping them put together a competitive application.

Program Evolution and Changes

When AWARE first launched its program, its leaders attempted to hold their workshops at times that would not conflict with regular work hours. They found, however, that fewer women could participate in their events if they were held after the official end of the work day because many of the female faculty had family care responsibilities that kept them from attending. The AWARE team shifted the hours of their workshops so they took place during work hours, allowing women with care responsibilities to engage with the program. This shift was as small and simple as holding events at 4:00 p.m. rather than 5:00 p.m., yet it had a huge impact on attendance.

AWARE has also loosened their rules around participant interactions with the EIR. When they first launched the EIR program, AWARE stipulated that the EIR could only meet with participants in the OTM office. They realized, however, that this created an additional constraint on participants' schedules and hours available to work on commercializing their innovations. Because participants already have many constraints on their time – most have full-time jobs, care and family responsibilities, and are adding this to their already busy lives – AWARE lifted this requirement. Once the flexibility and availability of the EIR increased, more participants were able to fully engage with and utilize the EIR.

Addressing Challenges

The AWARE leadership team reported that the program's greatest challenge is ensuring adequate staffing, which is directly tied to funding constraints. The AWARE team would like to offer more programs but has no dedicated full-time staff and is run by a Principal Investigator (PI) and co-PI who also hold other full-time jobs. The AWARE team stressed that the University has supported the AWARE program and ensures that it continues to operate by making the program part of the principal investigators' official University duties. The lack of full-time staff, however, has meant that plans for activities like a University-wide diversity training on the systemic issues affecting inclusion have been put on hold. The AWARE team said that although the program has been able to raise awareness about inclusion issues informally, they would like to secure additional funding to do more formal programming related to these issues.

Program leaders report that a lack of resources and full-time staffing has prevented them from tracking data on participants and past participants to the extent that they would like. Unless applicants self-identify, the OTM doesn't gather information or analyze the demographics of those applying for SBIR grants or utilizing the technology transfer office. There is also no formal system for following up with participants who use AWARE resources to track their progress through the innovation, patenting, and commercialization process.

Successes and Outcomes

While AWARE has not been able to gather official data or track their outcomes with concrete numbers, the program has heard numerous success stories of women who have participated and launched successful technology-based startups. The program leaders said they have also started to see a change in the culture at the University, with more commitment and dedication to increasing diversity in innovation, patenting, and commercialization.

AWARE was named a Champaign County Innovation Celebration Entrepreneurial Excellence Social Venture Finalist in 2017. The program has been replicated and launched at the University of Louisville, Missouri University of Science, and Indiana University. These other AWARE programs were started with funding from NSF and have worked to replicate the network-building and mentorship elements of the original AWARE program, tailoring it to their specific needs. The University of Louisville AWARE is running a talent matching series that helps match women and minorities with potential team members and mentors, Missouri AWARE is focused on helping women and minorities write and submit SBIR/STTR grants, and Indiana University AWARE (in partnership with the other two new AWARE programs) hosted a regional Entrepreneurship & Commercialization Summit in Indianapolis that focused on helping women and minorities move their innovations toward commercialization.

Future of the Program

While the AWARE program has already been replicated in other settings, the AWARE team at the University of Illinois stresses that each program should be developed with the specific needs of their universities in mind. While the general issues will often be the same – lack of diversity in innovation, patenting, and commercialization – the team emphasized that each university has a unique ecosystem that should be taken into consideration.

In addition to working with other programs to replicate the AWARE program in other university settings, AWARE would also like to increase their investment in technology-based startups, award more proof of concept grants, and do more early investing to help their participants launch their business ideas. AWARE is working to find a way to invest in startups in a manner that would allow returns from these investments to be used to invest in other cutting-edge opportunities.

More information about AWARE can be found at: http://researchpark.illinois.edu/AWARE.

Bioscience & Entrepreneurial Inclusion Initiative
BioSTL, St. Louis, Missouri

Program Founding

In 2001 the Coalition for Plant and Life Sciences, the precursor to BioSTL, was founded by the chancellor emeritus of Washington University in St. Louis to help build an entrepreneur infrastructure with the goal of making St. Louis a leader in bioscience research and commercialization. The Coalition became BioSTL in 2011 after receiving a $30 million commitment from Washington University in St. Louis, BJC HealthCare, and the St. Louis Life Sciences Project. BioSTL drives St. Louis' bioscience and innovation ecosystem through a comprehensive set of programs that seek to advance St. Louis' economy and the region's leadership in solving important world challenges in agriculture, health care, and other technology areas. BioGenerator, the investment arm of BioSTL, creates, grows, and invests in promising companies and entrepreneurs through grants, pre-seed, and seed investments to help bring new innovations to market (BioSTL 2018).

BioSTL began convening CEOs, entrepreneurs, and civic leaders in

Year Started	2014
Target Audience	Women, minority, and immigrant innovators and emerging entrepreneurs in the St. Louis region.
Cohort model	No
Women Only	No
Program Model	Informal/relationship building
Program Overview	2-Tier Strategy • Increase awareness of STEM-focused opportunities & innovations (Entrepreneurially Thinking Podcast; Annual events and Symposiums). • Provide training for emerging entrepreneurs (Partnership with local and own training programs). Connect regional resources for further support of entrepreneurs.
Funding Source(s)	Kauffman Foundation, JP Morgan Chase, the U.S. Small Business Administration

2008 to discuss how to increase diversity within the bioscience and entrepreneurial ecosystem. In 2013, BioSTL engaged its Entrepreneur in Residence (EIR) to develop and lead the new Bioscience & Entrepreneur Inclusion Initiative (the Inclusion Initiative), which provided unique programming geared toward women, minorities, and immigrant populations interested in building high growth, high net worth, STEM-focused businesses. In 2014, BioSTL secured funding from the Blackstone Foundation to launch its new initiative to increase diversity, inclusion, and equity within the St. Louis bioscience entrepreneurial ecosystem. The Initiative recognizes inclusion as a growth strategy and economic imperative for St. Louis, and proactively works to identify, attract, and retain talented women and minority STEM-focused entrepreneurs and provide a systematic pathway for them to create viable ventures.

In 2016 the Inclusion Initiative received a Kauffman Inclusion Challenge grant to help support BioSTL's work in building equity in tech-based entrepreneurship ecosystems at a regional level, with the idea that the work performed in St. Louis could be scaled or replicated in other areas in the United States. Together with its partners, BioSTL launched the St. Louis Equity in Entrepreneurship Collective. The Inclusion Initiative serves as a regional convener and facilitator for the newly launched Collective, working with 140 partner organizations to share best practices, align activities, and strengthen efforts to build an inclusive ecosystem in the St. Louis region.

Program Design and Implementation

Since its launch in 2014, the Inclusion Initiative programming has included a wide range of activities and tools to build awareness and inform individuals about opportunities in bioscience, providing customized, one-on-one training for future company founders, and connecting interested women and minorities to resources to help them secure employment in bioscience or start a new bioscience venture. For example, the Initiative hosts a weekly podcast (Entrepreneurially Thinking), holds monthly events and annual symposiums, sends regular newsletters, and provides pipeline programming for high school students. The Inclusion Initiative also works in close partnership with the Center for Emerging Technologies (CET) Square1 entrepreneurship training program. More than one-third of Square1's participants are referred to them through the Inclusion Initiative, vastly increasing the diversity of the training program participants.

"My ultimate goal is to build technology that supports people with special needs… I'm what they call a non-technical founder… BioSTL formalized the process… to connect me to a really astute team of people who have come to join my team… people who are everything I am not, but everything I need, to help close the gaps for the [NIH SBIR grant] I am working on…"

- BioSTL participant

BioSTL's Inclusion Initiative also helps those with the technical and scientific skills connect to individuals who may have ideas for products or services, but do not have the technical knowledge to build a prototype. The Inclusion Initiative keeps a comprehensive list of 1,400 experts, emerging leaders, partner organizations, and participants to connect participants to the resources and networks they need.

> "The first thing [the program] did was connect me to Square1 Ignite, a four week boot camp program… where you learn what a business model canvas is and work through your own business model canvas. [BioSTL then] invited me to bring my technology to an event and set up a booth and network… and the keynote speaker there became my mentor… and he has been extremely helpful in changing my thinking from a freelancer to a business person… I could do a lifestyle business, I could get business on the side and not push myself, or I can be an entrepreneur."
>
> - BioSTL participant

In 2017, the St. Louis Equity in Entrepreneurship Collective hosted the first-ever regional summit on equity in entrepreneurship, focused on race and gender equity among St. Louis' early-stage, tech-based entrepreneurship ecosystem, which brought together entrepreneurs, support organizations, funders, and investors to imagine and commit to actions that build race and gender equity into the ecosystem's future. The summit featured presentations, interactive activities, and solution-building discussions to plan a year of action for 2018. The Inclusion Initiative also hosts an annual VISION symposium, which began in 2015 and is the only inclusion symposium in the region. VISION is an entrepreneur and small business symposium that has reached more than 500 St. Louis entrepreneurs, students, and small business champions, who have left with significant resources and networks of support to build viable STEM-based ventures in St. Louis. According to BioSTL program leaders, feedback from the 2017 symposium showed that 85 percent of attendees were women and minorities, and 94 percent said that they made meaningful contacts to help their business grow.

Program Evolution and Changes

The Inclusion Initiative reports that it is continually evolving and adding new components to ensure that increasing diversity, inclusion, and equity remains a central focus of the growing bioscience entrepreneurial ecosystem in St. Louis. As of 2018, the Inclusion Initiative planned to add the following programs:

- Pipeline to Prosperity: An intentional outreach program to STEM-focused women and minority individuals interested in building viable businesses or technologies in St. Louis. This program would provide a select cohort with wraparound resources including experienced mentorship, financial support, network exposure and other network connections to ensure successful growth of STEM entities.

- Venture Capital Fellows Program: A competitive program that offers select individuals the opportunity to develop and grow their expertise as analysts within BioGenerator, the investment arm of BioSTL, under the supervision of professional fund managers. This program would provide Fellows with strategic training skills and real-life investment experience.

Addressing Challenges

Program leaders indicate that limited staffing is BioSTL's greatest challenge. The Director of the Inclusion Initiative is the only full-time staff person for the program. In addition to the Director, BioSTL's Communications Director helps with the program on a part-time basis.

Successes and Outcomes

The Inclusion Initiative has tracked basic data on the number of participants served since 2014 and recently started using a new data tool to collect and analyze more in-depth data on outcomes. Since 2014, the Inclusion Initiative has had 889 program participants. Of these, 395 were women, 393 were people of

color, and 118 were born outside of the US. The program has also completed 83 "deep assessments" of businesses and trained 94 company founders. Since 2014, Inclusion Initiative participants have raised more than $39 million in capital for their business ventures.

BioSTL's Inclusion Initiative has received nine national best practice recognitions. In 2017 JPMorgan Chase and the Initiative for a Competitive Inner City (ICIC) recognized BioSTL as a model for regional industry cluster building in their *Building Strong Clusters for Strong Urban Economies* report (Zeuli, O'Shea, and Nijhuis 2017). The report highlights the fact that BioSTL has made inclusion a central part of its growth strategy.

Future of the Program

The Inclusion Initiative plans to continue convening experts, hosting events, and conducting programs to ensure that diversity, inclusion, and equity are central to any growth strategy. The Inclusion Initiative is also working with partner organizations on how to collect and share data that effectively track individuals' outcomes over time and measure the impact of its diversity and inclusion efforts. In addition, BioSTL hopes to use their model to develop a blueprint that can be implemented in other areas across the United States.

More information about the Bioscience & Entrepreneurial Inclusion Initiative can be found at: http://www.biostl.org/about/inclusion/.

Empowering Women in Technology Startups (EWITS®)
University of Florida

Program Founding

Empowering Women in Technology Startups (EWITS®) is an entrepreneur training program at the University of Florida (UF). EWITS® is an experiential learning program designed to provide women with an introduction to the process of forming a startup venture and developing a commercialization strategy for cutting-edge, innovative technologies (EWITS® 2018). This 10-week program focuses on overcoming obstacles women face, including issues with work/life balance, lack of training, and lack of mentors and networks.

The idea for EWITS® was developed in 2012 by a team at the UF Hub technology incubator (the Hub). The EWITS® team developed the program without dedicated funding for the project, as a supplement to their existing jobs. The early planning stages were done during lunch hours and off-hours, and included gathering research on the unique obstacles women face in patenting and commercialization. The program founders presented an

Year Started	2012
Target Audience	Professional women
Cohort model	Yes
Women Only	Yes
Program Model	Formal/Boot-camp style
Program Overview	• 10 week program • Formal curriculum • Structured classroom sessions
Educational Topics	Market Analysis and Strategy; Commercialization Strategies and IP; Financials; Company Presentation; Corporate Structures; Sources of Funding
Funding Source(s)	University of Florida; U.S. Economic Development Administration grant funding; Al & Nancy Barnett Charitable Foundation; fees from participants; donations

economic argument to make the case for the University to support a program targeting women, showing how increasing the number of women commercializing through the University could increase innovation and revenue. EWITS® also had a University champion in the Director of the Hub, who helped ensure that EWITS® became a reality.

The EWITS® program was officially launched in 2012 by UF Innovate and the Hub at the University of Florida, and with support from the U.S. Economic Development Administration (EDA). EWITS® targets professional women who at least have a bachelor's degree, and half of all past participants have had an M.A. or higher. Since 2012 EWITS® has run six cohorts with approximately 40 women in each.

During its first year of operation, the program was provided for free, and in years two and three participants were charged $50. In 2015 and 2016, the program charged $100 and the fee was raised to $199 for the last cohort in 2017. Costs for the program were offset by a grant from the Economic Development Administration (EDA), with matching funds from the University of Florida. In recent years

EWITS® has also received some financial support from donors and sponsors, which was used to help cover program costs and keep the cost to participants as low as possible. EWITS® has no full-time dedicated paid staff and is able to continue due to the support of the University, which donates space and pays the salaries of the University staff who run the program. In addition, all of the mentors, speakers, and investors who work with EWITS® volunteer their time and, if they come from out of town, pay for their own travel and lodging.

> "I am working in a laboratory and we had a technology that we tried to patent…and the professor and colleagues were interested in starting a company based on that technology…and they invited me to join the [business] team, but my background is in science and engineering, I don't have a background in startups or business at all…I have this [entrepreneurship] opportunity and [Ewits] was an opportunity for me to learn more about [the business and commercialization] side."
>
> - Former EWITS® participant

Program Design and Implementation

EWITS® is a 10-week, hands-on experiential learning program that consists of weekly 2 or 3 hour sessions. The participants are put into teams of women with a variety of backgrounds, expertise, and disciplines that mirror the structure of a real company, such as finance, science, marketing, business, and law. These teams then use a real cutting-edge technology—chosen by the EWITS® staff from the various innovations within the University technology transfer office—to create a simulated company based on the innovation. Each team is also led by an experienced female entrepreneur or businesswoman, who helps guide its members through creating a business plan and investor pitch. At the end of the program, each team presents their business plans and investor presentations to a panel of female investors who serve as judges and give feedback.

The curriculum for the program was developed in-house to focus on addressing the issues that women often face when commercializing a technology or innovation. Each session follows the same basic format: a recap of the information covered by an e-learning video watched before attending the class and Q&A session; a brief facilitated discussion about obstacles to entry and/or a topic of interest related to women in business/technology-based startups; a female guest speaker discussing her experiences and strategies for overcoming barriers to entry for women in leadership; and team breakout sessions with the mentors. Much like a college class, each participant is given a program workbook that fully outlines the program, program expectations, and what each session will cover, along with additional resources and readings.

The first week of the program is dedicated to introducing the participants to various technologies and mentors – giving each participant the time to rank the technologies and mentors they would like to work with. The last week is dedicated to the investor pitch competition. The syllabus for the remaining eight weeks covers the following topics: Understanding the Value Proposition and Forming the Team; Market Analysis and Strategy; Commercialization Strategies and IP; Financials; Company Presentation; Corporate Structures; Sources of Funding; and Creating a Pitch Presentation.

Rather than bringing experts in each week to present the educational portion of the program, EWITS® chose to make videos of experts discussing the selected topics. These videos are shown to each cohort, ensuring that all program participants receive the same information.

Program Evolution and Changes

While originally each session included time for watching educational videos, participants said they wanted more opportunity for discussion, and now watch the videos on their own before the next session. EWITS® has shifted the focus of the discussions to spend more time on strategies for addressing

obstacles in addition to talking about the obstacles themselves. EWITS® has also institutionalized mentor and team check-ins to help reinforce the idea that commercializing innovation is an ongoing learning process, and that participants should not be too concerned with "perfect execution."

To lift up women innovators as much as possible, EWITS® wanted the program to be entirely women-led and women-driven. For the first cohort, the program only used technologies created by female inventors, but in subsequent years included technologies by male inventors, to expand the number of technologies or inventions available for use. The program's mentors, speakers, and judges continue to be all women.

Addressing Challenges

One of the biggest challenges the program faced while getting started was making the case to stakeholders that a woman-focused program would be an appropriate and effective strategy to help close the gender gap in patenting, innovation, and commercialization. The EWITS® team was committed to the idea that, at the early stages of learning about commercialization, women-focused programming can help facilitate success by creating a safe space for women to discuss the unique challenges of being a woman in male-dominated environments.

EWITS® continues to face two closely connected difficulties: staffing and funding. While running EWITS® is a part of the official job duties of university staff who work with the program, the program's leadership hopes to have funds to cover a full time staff person. EWITS® does receive financial and in-kind support, which helps to keep program costs low for the participants. EWITS® also makes use of the resources available to the program through the University of Florida, produces many of its curriculum materials in house, and participants have access to the University library for the research components of the program. EWITS® also works to identify experts who are willing and able to donate their time to the program and cover their own expenses.

Successes and Outcomes

In 2017 EWITS® sent out an impact survey to the first five cohorts of program participants (2012-2016). Of those who responded, 7 percent reported that they started their own business; 29 percent went to work for tech companies (the majority of which were tech startups); 6 percent applied for SBIR/STTR funding; 14 percent applied for other grant funding; 10 percent reported making an investor pitch; and 4 percent pursued funding from a bank or other commercial entity. While 58 percent of respondents reported a professional status change since participating in the program, a high percentage of participants were students, which means additional analysis would be required to track their post-graduation professional activities.

The program was also the subject of an evaluation by a University of Florida Ph.D. student who conducted the study as a part of her dissertation. This mixed-methods study found that participants felt EWITS® "created a safe space to explore gender inequalities and that the program provided mentorship to help [participants] navigate the process." Participants also reported that EWITS® helped them develop the technical skills to take an innovative idea from concept to market, or to validate that they already possessed those skills. When asked to rate their skill level prior to attending EWITS®, 70 percent of participants rated their knowledge of commercialization as below average, 21 percent as average, and 9 percent above average or excellent. After completing the program, only 9 participants still rated their knowledge as below average, while 29 percent rated themselves as average, and 62 percent above average or excellent.

> "I really learned… how to focus on the technology and really understand who your target audience is, what is the best way to sell your technology, how to [conduct] a business market analysis and how much [time] you might need to invest."
>
> - Former EWITS® participant

The analysis also shows that at the end of the EWITS® program, participants were more likely to have entrepreneurial intentions: survey respondents reported a 23 percent increase in entrepreneurial intentions after attending EWITS® (Calhoun 2017).

Future of the Program

The EWITS® team recently launched a companion program, The Collaboratory for Women Inventors, which supports active or aspiring women innovators and entrepreneurs through workshops, training opportunities, a coworking space, and informal networking and mentorship. The Collaboratory, launched in 2018 with funding from the U.S. Economic Development Administration and the University of Florida, operates through a partnership between UF Innovate and the UF Warrington College of Business Center for Entrepreneurship and Innovation, and has dedicated staff.

More information about EWITS® can be found at: http://ewits.org/.

MyStartupXX, Rady School of Management
University of California San Diego

Program Founding

MyStartupXX is an accelerator program that was started to increase and encourage diversity in commercialization and entrepreneurship. Noting the specific challenges that women face when seeking venture capital, creating networks, and connecting to mentors, the mission of MyStartupXX is "to nurture the next generation of founders and technology companies through mentorship, education, and funding" (MyStartupXX 2018).

Prior to the launch of the program, after noticing that female students were vastly underrepresented on campus when it came to patenting, innovation, and commercialization, the MyStartupXX team used an initial $27,000 grant to start a two-year research project. That project included focus groups and a review of innovation projects to learn more about women's experiences in innovating and commercializing at UCSD. The research found that only 1 in 100 innovation projects on

Year Started	2012
Target Audience	Undergraduate, graduate, postdoctoral students, and recent alumni
Cohort model	Yes
Women Only	No – teams must be women-led
Program Model	Formal/Accelerator style
Program Overview	• 6 month program • Meets every 2 weeks • Formal curriculum • Structured classroom sessions • Workspace for prototype development • Small seed grants
Educational Topics	Market Analysis and Strategy; Commercialization Strategies and IP; Financials; Sources of Funding
Funding Source(s)	Venture Well; U.S. Small Business Administration; individual donors

campus were run by women. The focus group data also indicated that many female students at UCSD wanted to participate in team innovation projects, but often did not because they felt unwanted or overlooked. This research became the basis for the development of the MyStartupXX program. The program leaders viewed the research as a critical first step because gender diversity in patenting, innovation, and commercialization was not being discussed on campus and few saw the need for an accelerator program focused on closing this gender gap.

By the fall of 2012 MyStartupXX launched under the umbrella of the Rady School of Management at UCSD. The program was initially funded by a grant from Venture Well, given to MyStartupXX to focus on increasing diversity in technology and innovation-based startups. MyStartupXX has been able to continue operating with support from the state of California and an award from the U.S. Small Business Administration, as well as individual donations. UCSD has supported the program by ensuring that it has a dedicated space for the workshops and for the teams to collaborate and build prototypes.

MyStartupXX is open to all undergraduate, graduate, and postdoctoral students, as well as recent alumni, who have a technology-based business idea, regardless of gender. Each innovation team, however, must have a woman in a prominent leadership position (either as the CEO or other equally prominent leadership position on the team).[5] Male students have comprised about one-quarter to one-third of each cohort throughout the life of the program.

MyStartupXX also strives to ensure racial and ethnic diversity as well as diversity in thought. The program reports that the share of women of color who participate in MyStartupXX is comparable to the share of women of color who attend UCSD, and the majority of female participants are White and Asian. The program accepts teams at all stages of development and does not require any team to have a prototype at the time of application. Though the initial cohort included only three teams, the program served a total of 50 teams and/or individuals between 2012 and 2017.

Program Design and Implementation

MyStartupXX is a six-month program for teams or individuals who have an idea for a technology-based startup company. It focuses on "team building, leadership, performing a market assessment and obtaining customers' feedback, creating a value proposition, validating business models, and understanding financing strategies needed to launch the business" (MyStartupXX 2018).

The program follows the academic calendar, with workshops every other week. While MyStartupXX follows a curriculum to educate participants on the basic aspects of patenting, commercialization, and launching a business, much of the program is focused on having the teams work with mentors and advisors to support and encourage their progress with their own startup. The workshops include time for the teams to discuss their individual successes and challenges and troubleshoot with mentors and their peers. One of the program's main goals is to ensure that women have the opportunity to take their idea from concept to market, understanding that the process is complicated, that many startups fail, and that they will encounter additional challenges based on gender biases.

The program is designed to encourage peer mentoring across diverse cohorts with teams operating at various stages of development. Peers learn from each other as the teams are asked to share their highs and lows from their experiences over the past two weeks, which allows teams to get advice from others who have experienced something similar. It also allows those who have not experienced a particular challenge to learn about potential future pitfalls and ways of navigating complicated and tricky processes.

During the six months of the program, MyStartupXX also holds networking events where participants can meet female investors, inventors, and entrepreneurs to help the participants begin to form their support networks. Through these mentor mixers, participants have opportunities to form relationships with individuals who can guide them along their path, help them hone their ideas and business models, and connect them with networks of investors.

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[5] Individual women may also apply to the program, but male students must be part of a team that contains at least one female member as a team leader, founder, or co-founder.

MyStartupXX partners with Athena San Diego, a professional association dedicated to advancing women in STEM through educational and mentoring programs. The partnership with Athena gives MyStartupXX access to a network of more than 500 professional women in STEM across a range of sectors, who often attend the mixers and act as mentors to teams as they progress. At the end of the program, five teams from each cohort are selected to present their business plans to senior Athena members for comments and feedback.

> "[The biggest takeaway from the program so far] has been the peer support, that I am not alone, that encouragement that if all the other program participants can do it, and are doing it, and want to do it, then why can't I. It gives you that social support, that social encouragement that [commercialization] is an option among other options."
>
> -   MyStartupXX participant

Program Evolution and Changes

Many MyStartupXX participants are at early stages in their innovation and commercialization process, focusing on developing prototypes, working on market analysis and initial business plans, and securing patents and protecting their intellectual property (IP). The program has not concentrated on working with participants to help them hone and refine an investor pitch, since many have not reached that stage by the end of the six-month program. The MyStartupXX program developed a second stage of the program tailored toward participants who have completed stage one and are at the point in their business plan where they can seriously work on their pitch to funders. MyStartupXX Stage 2, which will launch its first cohort in 2018, will help participants hone their pitch plan and will include intensive one-on-one work with mentors to help them secure funding and launch their technology-based startup business.

Addressing Challenges

While MyStartupXX has the funding to run workshops and programming, the program leaders hope to develop the capacity to invest in the program's participants and their ideas. One of the major challenges that participants face in taking their innovations from idea to market is the lack of early investment in their ideas. Program leaders emphasized that many companies are asked by investors to do more and more early on with less and less funding, putting the financial burden on the innovators, which hinders their ability to launch a successful business. Getting early investment into an idea, however, often leads to additional funding, since other investors are more likely to invest in a technology-based startup that can show prior backing. MyStartupXX leaders say they hope to be able invest more in these companies early on, to act as a catalyst that sets teams up for success with external investors. At the same time, investing early in startups could allow the program to reinvest any dividends back into a venture fund, which would help ensure funding for future participants.

Successes and Outcomes

When asked about the program's success, both program directors and participants mention the growth of the program over the years as a key indicator. The first year that MyStartupXX ran, only three teams applied to the program, all of which were accepted. Each year the program has seen a marked increase in both interest and in the number of interested teams it could accept. In 2017 MyStartupXX accepted 20 teams into the program.

MyStartupXX has helped launch some very successful women-led businesses, which

> "[Programs like these help with] providing a different kind of role model, a different kind of picture of what success looks like. Not just for women who need to be inspired to follow in those footsteps, who have a great idea and just haven't seen it done, but also for investors to see that you don't really need to be an Ivy League drop-out in jeans and a hoodie to be a successful entrepreneur. Success can look this way, too."
>
> - Former MyStartupXX participant

reinforces the validity of their model not only to the UCSD community but to the women on campus who are interested in innovation, commercialization, and entrepreneurship. One of the main goals of the program is to increase the representation of women innovators and entrepreneurs on the UCSD campus. Since the inception of MyStartupXX the involvement and representation of women innovators on campus has increased dramatically. For example, in campus-wide innovation competitions, female students now represent 50 percent of the competitors.

Future of the Program

For the more immediate future—and in addition to launching stage 2 of the program—MyStartupXX is focusing on building an unrestricted investment fund to invest in their participants' companies at critical early stages. The Rady School of Management has recently established the Rady Venture Fund, which will allow the school to invest in their accelerator programs, including MyStartupXX.

More information about MyStartupXX can be found at: https://rady.ucsd.edu/centers/ciid/mystartupxx/.

REACH for Commercialization™
Ohio State University

Program Founding

REACH for Commercialization at Ohio State University (OSU) consists of a series of structured workshops "designed to help women faculty and post-doctoral scholars explore commercialization as a means of expanding the impact of their research" (REACH 2018). The stated goal of REACH is to ensure that female faculty and postdoctoral researchers view commercialization as a viable option for their research and innovations.

Originally titled "Project Reach," the idea for the REACH program was first developed in 2008. The founding team saw that women were actively inventing and innovating at Ohio State, but that the data for commercialization metrics from the University's Technology Commercialization Office did not reflect this activity. In 2008, "Project

Year Started	2010
Target Audience	Female faculty, graduate, and postdoctoral students
Cohort model	Yes
Women Only	Yes
Program Model	Formal and Relationship focused
Program Overview	• 4, 3-hour seminars • Formal but flexible curriculum • Building peer networks; connecting to mentors
Educational Topics	Visioning the impact of your research; Learning the Landscape; Building a Team; Understanding the Funding Life Cycle
Funding Source(s)	National Science Foundation; Ohio State University

REACH" was launched after Ohio State was awarded an ADVANCE Institutional Transformation grant from the National Science Foundation (NSF). This five-year grant allowed the REACH team to design and launch a formal program to address the commercialization gap at OSU.

The first two years of the grant (from 2008 to 2010) were used to survey female faculty members at OSU to get a sense of how they understood the causes of the commercialization gap. The survey responses indicated that women faculty felt they lacked informal and formal networks that provide critical career information, and validation that their innovation is worth commercializing. They also suggested that women at the university did not receive the same proactive, intentional sponsorship throughout their careers that men did. The REACH program was developed to intentionally address these gaps.

The REACH program launched its first cohort in 2010. Since then the program has had four on-campus cohorts (2010, 2011, 2015, 2017), each with a range of 12 to 23 participants, and a national conference in 2012, for a total of 105 women served in the history of REACH. In 2015, after the NSF funding expired, "Project REACH" officially became REACH for Commercialization™ and received institutional funds to support the program. The REACH director established a new office called Ohio State ADVANCE, housed within the Office of Research and funded through the Office of the President. REACH partners with Rev1Ventures, an investor startup studio that provides strategic services and capital to startups based on technologies developed at Ohio State University, as well as with other central Ohio startups.

Rev1Ventures offers its training space for all REACH workshops free of charge, and REACH offers Rev1 access to a diverse pipeline of potential startups.

Though REACH's programmatic funding was covered primarily by their NSF grant in the first 7 years, the program did charge $400 in tuition per participant to cover additional expenses, payable by the dean or department chair. To attend the REACH program, participants must be nominated and sponsored by their department chair or dean of college, ensuring departmental buy-in to the program. Following the end of the NSF grant in 2015, the tuition increased to $1,000 per participant. Though the program has evolved over time, the core mission has remained the same: to increase the representation of women in commercializing academic research to more accurately represent their invention successes in the laboratory, classroom, clinic, or studio.

Program Design and Implementation

REACH for Commercialization consists of a series of four three-hour workshops held in consecutive months during the academic year. There is a formal start and it concludes with a "graduation" with certificates (though it is not an official for-credit certificate program) and a celebration with campus and department leaders, local entrepreneurs, and government officials. Each cohort attends interactive workshops that cover a range of topics essential to the commercialization process. The workshops also expose participants to women who have experienced the patenting and commercialization process and give the participants space to discuss the challenges they face.

> "I didn't understand how companies come into being… I didn't understand how companies raise money and that you could be a company if you don't have any money or an office… and the whole patent process too… now it's starting to feel real, like someone really could make a company and sell this and my idea could be used in the world somewhere."
>
> - REACH participant

Each seminar is structured around one specific theme and uses a flexible curriculum to inform participants about the issue. Since one of the program goals is to connect women participants to peer mentors and networks with experience and expertise in patenting, commercialization, and entrepreneurship, each workshop combines education with panel presentations that include investors, past REACH participants, campus leaders who support commercialization, and entrepreneurs from OSU and the community to help participants start to build the networks that will be key to success. Workshop one, "Visioning the Impact of Your Research," gives some basic background on the commercialization process and features a panel of successful women entrepreneurs from OSU. The participants also discuss their own research programs, ideas for potential future commercialization, and the challenges and benefits of commercialization. Workshop two focuses on "Learning the Landscape" specific to OSU. Participants are introduced to team members from OSU's Technology Commercialization Office and Rev1Ventures, and the ways these two entities help take research ideas, inventions, and technologies and turn them into business opportunities and products that can be marketed locally and globally. Workshop two also features a panel of deans and department chairs who have successfully commercialized their innovations. Workshop three examines the process of "Building a Team." The final workshop, "Understanding the Funding Lifecycle," brings in experts from the Technology Commercialization Office, Rev1Ventures, and other places to discuss the variety of funding sources available and the expectations of each.

While REACH has a fixed curriculum, the program leaders build some flexibility into each session so that the workshops can meet the individual needs of the participants. The main goal of the program is ensuring that they have the tools they need to succeed with patenting and commercializing their innovations. To

make sure that each cohort is on track, the participants complete a brief survey after every workshop. They complete a more comprehensive self-assessment before workshop #1 and again after workshop #4. This enables the REACH team to ensure that the program is both covering the information that is important to the participants and helping them tackle the commercialization process.

Program Evolution and Changes

REACH leaders identified several programmatic changes that have been implemented. For example, REACH was originally only open to female faculty who were already tenured within the STEM and Medicine (STEMM) disciplines at OSU. In the early cohorts, REACH tried to "protect" pre-tenure women from diluting their path to tenure by adding too many activities that might derail their tenure process. After the second cohort, the organizers realized they were missing a significant portion of the untapped commercialization potential. The target audience was subsequently broadened to all female faculty in STEMM, then to female faculty from all disciplines. In the 2017 cohort, REACH cast an even wider net to include female postdoctoral researchers and a Ph.D. student. This change has brought in more young women into the program and diversified the cohort network.

The REACH program structure has evolved over the lifetime of the program. At first, the program was more academic and formal, focusing on the curriculum and imparting information to participants. Over time, it evolved to include honest discussions about the obstacles and strategies for success for women in the patenting and commercialization space.

In 2017 REACH hired an Entrepreneur in Residence (EIR), who is a co-founder of a medical device start-up. This EIR has spoken as a panelist at all of the REACH workshops since 2010, serves as a mentor, and connects participants with other mentors and resources within the academy and community. The addition of the EIR has generated increased interest in the program as word of mouth has spread about how the EIR provides additional guidance to participants and former participants; former participants have begun to share their positive experiences through organic, informal networks (as men are often thought to do). The EIR also recruited many interested women faculty, postdoctoral researchers, and graduate students for the next cohort.

The EIR has allowed the program to offer more one-on-one mentoring for current and past participants. Providing a dedicated resource in the form of an experienced EIR also allows the cohort members to ask questions and get answers as they arise, which inevitably happens outside the formal workshops.

Addressing Challenges

When first implementing the program, one of the challenges the program faced was marketing the workshop series to a very large institution in a way that would attract participants. Recruitment for the initial cohorts was time-intensive and required many meetings with faculty (in small groups or individually), presentations to deans and college executive committees, and information sessions, all over a short period of time. Since then the REACH program has evolved to pursue a year-long marketing campaign, which alleviates the amount of work that must be done right before each cohort runs. Once the program had run for a few years, future marketing materials and information sessions could include success stories. The proactive recruitment of future cohorts

"I asked people about [patenting] when I was pre-tenure. I said 'do patents count for tenure' and half the people said yeah it counts because you have the U.S. government stamp of approval that this is something original. The other half said no it doesn't count because it's not peer reviewed, don't waste your time."

- Former REACH participant

by REACH participants via the informal networks of friends and colleagues, as well as through word of mouth, also became a significant part of recruiting the later cohorts.

One of the greatest challenges the program leaders said they faced early on was getting widespread support across the University. The Technology Commercialization Office did not collect demographic data on faculty invention disclosures or patent applications and, while there were small pockets of women on campus who were active in commercialization, there were no networks to connect them and no community to support their activities. This led to an environment where there was a lack of awareness of the need to proactively engage women in commercialization. Obtaining federal funding from the NSF to launch this project helped to validate the need for a program like REACH. After the launch of the REACH program, and as it gained prominence within the OSU community, REACH was able to show that the gender gap in commercialization is important, and that a program like REACH is essential to both helping women and close this gender gap.

Limited staff represents another challenge. As of the writing of this report, the REACH team was seeking outside funding to transition the EIR from a part-time contractor to full-time employee.

Successes and Outcomes

Over the years, REACH has seen a significant increase in activity of their participants in the tech transfer process. For example, 17 invention disclosures have been filed from the 2017 cohort of 23 women; of the 17, 6 of these technologies have already filed patent applications, with another 3 patent applications in the process of being filed. Another critical outcome is that two sets of interdisciplinary collaborative pairs formed within the 2017 cohort, and these pairs subsequently filed invention disclosures and patent applications on their combined ideas.

Table 1 below shows the results of participants' self-assessments from the 2017 cohort. According to the self-assessments, the REACH program helps its female participants gain the knowledge and confidence to take an innovation or idea from concept to patent and/or commercialization. Most importantly, women go from feeling like they lacked the connections and networks to successfully pursue commercialization of their research before the program, to feeling like they have gained the contacts and built the networks they needed. The self-assessments also show that participants' confidence greatly increased, and that after completing the program, they were more likely to feel they belonged at industry events and were more comfortable engaging with venture capitalists.

Future of the Program

REACH is designed to meet faculty members "where they are" in their careers and offer individualized education and support. With a belief that validation from thought leaders and peers is important to entrepreneurs' progress, the program works by inviting panels of supportive leaders from around the university community to provide constructive feedback and suggestions. The REACH program complements more formal and/or traditional programs that focus on educational content.

REACH would also like to extend its services to undergraduates in addition to graduate students, postdoctoral researchers, research faculty, and tenured faculty. Ultimately, the REACH team would like to expand the program to other universities and even the private sector and government. The REACH team hopes to develop a train-the-trainer program that would take the program to other settings and create a network of inventors that would serve as peer-mentors across the United States.

More information about REACH for Commercialization can be found at: http://advance.osu.edu/initiatives/project-reach/.

Table 1. Self-Assessment of REACH Program Participants Before and After their Program, 2017

Question	Before REACH	After REACH	Percent Change
I have the contacts, networks, and connections I need to successfully commercialize my research	1.7	4.1	**141%**
When I go to industry events, I feel comfortable that I belong there	2.0	3.6	**80%**
I feel comfortable engaging with venture capitalists	2.2	3.3	**50%**
I have a wide range of professional contacts outside of academia	2.5	3.5	**40%**
I can tolerate the risks involved in commercializing my research	2.6	3.6	**38%**
I am able to articulate the value of my research	3.0	4.1	**37%**
I can draw up detailed plans to convert strategy into actions	2.6	3.5	**35%**
I feel confident in my ability to build a team	3.3	3.8	**15%**
I can tell the story of how I got to where I am with my work	3.5	3.9	**11%**
Average	2.5	3.5	**40%**

Note: Data show participant responses on a scale of 1 to 5, with 5 reflecting the highest degree of confidence in each item listed. These data include responses from the 11 participants (of the 23 in the 2017 cohort) who responded to both the pre- and post-assessments.
Source: Program data from the REACH for Commercialization team.

SBIR/STTR Phase 0 Assistance Program
Department of Energy

Program Founding

The United States Department of Energy (DOE) launched the Phase 0 Assistance program in 2014 to help increase diversity within its Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Phase I grantees. Phase 0 was designed to increase the number of quality proposals submitted for DOE Phase I funding by women-owned small businesses, small businesses owned by socially and economically disadvantaged individuals, and small businesses located in DOE's underrepresented states.

The SBIR/STTR Reauthorization Act of 2011 required SBIR/STTR agencies increase outreach to underrepresented groups. This led the DOE to search for and identify programs that could help increase diversity in its Phase I applicant pool. They discovered that several states were successfully using grant application support to increase small businesses' chances of winning federal SBIR/STTR grants. This support was commonly referred to

Year Started	October 2014 (Fiscal Year 2015)
Target Audience	Women-owned, socially and economically disadvantaged small businesses; small businesses from underrepresented states
Cohort model	No
Women Only	No
Program Model	In-kind advice and assistance on SBIR/STTR Phase I applications, Business Mentoring & Consultation
Program Overview	Direct assistance with developing a competitive Phase I grant application
Services provided	Letter of Intent review; Phase I proposal prep & registration assistance; Market research assistance; Technology and IP assistance; Budget and financial assistance
Funding Source(s)	U.S. Department of Energy

by states as Phase 0 assistance. Once the DOE team settled on a program model, they put together a budget and launched the first national SBIR/STTR Phase 0 Assistance program.

While the DOE is responsible for developing the overall goals and objectives of Phase 0, the day-to-day operations of the program have been contracted out to Dawnbreaker, a woman-owned small business consulting firm that works with federal agencies and specializes in providing SBIR/STTR commercialization assistance to innovators. The Phase 0 program accepts participants on a rolling basis in the 16 weeks between when the Phase I topics are released and the application due date. Most participants, however, apply to Phase 0 within the seven weeks prior to the close of the Funding Opportunity Announcement.

Phase 0 services are free to those who qualify and are accepted into the program. Between 2015 and 2017, Phase 0 assisted between 60 and 150 participants per year and has provided hundreds of services to more than 300 people over 7 cycles (there are two cycles each year). During this time, DOE had the funds to

serve more participants. The Phase 0 team attributes much of the program's success to having legislation that mandates the program, and consistent funding, which has allowed Phase 0 to focus fully on meeting the needs of its participants.

Program Design and Implementation

To implement the Phase 0 program, the Dawnbreaker staff—which includes business coaches, business researchers, and marketing and design people—provides services to each participant and tracks their progress through the program until the application due date.

Depending upon the timing, each person accepted into the program can choose anywhere from one to six of the eight services that Dawnbreaker provides. If applicants apply for Phase 0 shortly after the SBIR topics are released, they are eligible for 4 standard services (see items 1-4 below) plus up to two more services (see items 5-8 below). If applicants apply later in the cycle, closer to the Phase I application due date, they may receive fewer time-sensitive services. The services provided are:

1. Letter of Intent (LOI) Review: Depending on how early they apply to the Phase 0 program, participants can get assistance on the initial LOI that must be submitted about one month after the release of the Funding Opportunity Announcement (FOA).

2. Phase I Proposal Preparation, Review, and Registration Assistance: The Dawnbreaker coaches work with the participant to set a schedule for proposal preparation. The consultants also work with them to ensure they are registered on all of the mandatory government websites, which can be a difficult and time-consuming process for first-time SBIR/STTR applicants.

3. Market Research Analysis: A Dawnbreaker analyst will help conduct a brief market analysis for the participant and provide them with an initial market analysis report that they can use to inform their proposal.

4. Small Business Training and Mentoring: For this service, participants work closely with a business coach who will, depending on the needs of the business, help with the overall structure of the company, creating a new business model or business strategy, or mapping out a plan for the future progress of the small business.

5. Technology Advice and Consultation: If needed, participants can get up to three hours of technical consultation from an expert provided by Dawnbreaker. These consultations are not with Dawnbreaker staff, but are with a domain expert, often from a research university or institution who can help the participants troubleshoot or refine their technology.

6. Intellectual Property (IP) Consultation: If participants are in need of assistance with IP, Dawnbreaker will connect them with access to a U.S. Patent and Trademark Office-registered IP practitioner to help them navigate the IP protection process and address general issues of concern.

7. Indirect Rates and Financials: Dawnbreaker provides accountants to help participants prepare their Phase I project budgets and accurately calculate their expenses for the Phase I application. They also help ensure that the budget complies with the DOE FOA guidelines.

8. Travel Assistance: The participants can be reimbursed for pre-approved travel expenses to a DOE national laboratory or research institution to develop collaborative relationships that are relevant to securing a Phase I award.

All in all, each participant can receive up to $5,000 of in-kind services to help them prepare and apply for a DOE Phase I grant.

Program Evolution and Changes

Phase 0 has not made many programmatic changes since it was launched in 2015 but has made a few changes to its eligibility rules to ensure inclusion. First, the DOE changed the language from "minority" owned small businesses to "socially and economically disadvantaged" small businesses. Phase 0 team members stated that the broader terminology allows the program to include more population groups, including those who have disabilities. A second major change to the Phase 0 eligibility rules entailed removing the "three-year" rule–which stated that individuals were eligible as long as they had not won a DOE Phase I grant within the last three years–and instead only allows those small businesses to apply to the Phase 0 program that had never won a DOE SBIR/STTR award. Following this change DOE is primarily targeting first-time applicants who need services.

Addressing Challenges

When Phase 0 was first starting, it received some comments from states that were concerned that the federal program could draw state participants away from their respective small business development centers (SBDC), which they feared might reduce state SBDC funding for similar services. To alleviate this worry, the DOE established informal partnerships between its Phase 0 program and the state SBDCs, where each partner would begin referring small business applicants to one another for resources and assistance that the other did not provide. This helped Phase 0 build networks, establish partnerships, and tap into state networks.

According to the DOE, perhaps the largest challenge that participants face when entering the Phase 0 program is dedicating the time and effort necessary to pull together all the required documentation that comprises a DOE SBIR/STTR Phase I grant application. DOE ensures that Dawnbreaker fully informs all first-time DOE SBIR/STTR applicants that it can take more than 120 hours to complete a Phase I grant application. Since most Phase I applicants participating in Phase 0 have full-time jobs and other commitments, one of Dawnbreaker's tasks is to work closely with each Phase 0 participant to create a schedule of activities to clarify the time commitment involved with developing a competitive DOE SBIR/STTR grant proposal.

Successes and Outcomes

The DOE tracks the success of all those who apply for Phase I grants. Overall, about 20 percent of all DOE SBIR/STTR applicants are awarded a Phase I grant; among all DOE first-time applicants, the success rate is a little lower, about 15 percent. Underrepresented applicants who participate in the Phase 0 program and are submitting their first Phase I application are awarded grants at a slightly higher rate (13 percent) than first-time underrepresented applicants who do not go through Phase 0 (9 percent). When looked at independently from all Phase 0 underrepresented applicants, however, first-time Phase 0 women applicants had a somewhat higher award success rate (14 percent).

The Phase 0 model was replicated at the federal level within three of the United States Department of Health and Human Services (HHS) institutes in 2017 (the National Cancer Institute, the National Institute of Neurological Disorders and Stroke, and the National Heart, Lung and Blood Institute). The SBA, via Dawnbreaker, is administering these new Phase 0 programs on behalf of HHS; these programs take all

first-time applicants. The HHS Phase 0 program has SBA approval to continue functioning through September 2018; however, as with the DOE, HHS funding is also contingent on Congressional reauthorization of the SBIR Administrative funding.

More information about the DOE Phase 0 program can be found at: http://www.dawnbreaker.com/phase0.php.

STEM to Market
Association for Women in Science

Program Founding

STEM to Market (S2M) is a two-part program that provides entrepreneurial training and support to women in STEM fields, and works with key decision-makers, investors, and funders to address systemic bias that hinders innovation and entrepreneurship for diverse groups of women. S2M was developed by the Association for Women in Science (AWIS); the program was launched in 2017 with support from the Kauffman Foundation.

The S2M program grew out of AWIS' previous research on diversity and inclusion in STEM innovation and entrepreneurship. Their research identified numerous challenges affecting women's participation in innovation, patenting, and commercialization in university settings. In 2015 and 2016 AWIS held three national summits—in Washington, DC; Oakland, CA; and Chicago, IL—to bring together influential

Year Started	2017
Target Audience	Women in STEM; Investors
Cohort model	Yes
Women Only	Yes (Accelerator program) No (Investor program)
Program Model	Formal/Accelerator model Virtual
Program Overview	• 11-12 month program • 5 months of formal virtual curriculum • Day-long seminar • Networking with investors • 5 months of working on commercializing their research/technology with staff and investor mentors
Educational Topics	Market Research; Business models; Finance & Funding; Trademarks & Patents; Team Building; Branding; Reducing investor bias
Funding Source(s)	Kauffman Foundation

stakeholders to develop ideas for promoting inclusion in entrepreneurship, advanced manufacturing, and technology transfer. Though there were differences in the context in each region, these summits highlighted important similarities that informed the development and launch of the S2M program. First, the regions had very few accelerators focused specifically on gender and STEM. AWIS notes that typical accelerator, incubator, or boot camp programs often leave women feeling excluded or poorly treated (AWIS 2018). AWIS also identified a need to address investor bias, one of the systemic barriers affecting diversity and inclusion in technology-based entrepreneurship. AWIS developed S2M to address these two sets of issues in tandem.

S2M runs three concurrent but staggered programs in three different locations: Washington, DC; the San Francisco Bay Area; and Chicago, IL. Each S2M program has two components: 1) The AWIS Accelerator, a virtual accelerator for women in STEM fields who have an idea that they want to commercialize and 2) AWIS Intentional Investing for leading members of the investment communities. To be eligible for the accelerator program, participants must have advanced training in one or more STEM fields, have STEM research that they want to commercialize, have already made some investment (time and/or money) in the idea—for example, applying for a patent, interviewing potential customers,

completing market research, or other related work—and made the commitment to complete the curriculum and assigned tasks. Funded by a grant from the Kauffman Foundation, S2M is free to participants.

Program Design and Implementation

The S2M program is a two-pronged program that works with women and investors. The AWIS Accelerator program is an 11-12 month virtual program that is broken down into three phases. The first phase, Foundation, lasts 5 months and consists of biweekly online training, working group meetings, and open office hours. S2M uses a structured curriculum that is based on the I-Corps™ training curriculum, but specifically tailored for each cohort. The curriculum covers the following topics: Vision, Market, and Customer Discovery; Business Model; Finance; Legal (IP and patenting); People and Team Building; Product Development; Branding and Positioning; Sales and Traction; and Mentoring.

> "In my career path in academia, minority women such as myself are not encouraged to pursue technology or celebrated as inventors. When I found out about AWIS S2M and it was specifically devoted to helping women and addressing women's needs in terms of training, I thought that would be a good space because I felt that I would get the right mentors and the right support that I needed."
>
> – Bay Area Cohort Entrepreneur

Each cohort is divided into smaller working groups that meet weekly and allow the participants the time and space to think through coursework, get peer feedback, and discuss challenges, issues, and possible solutions. Open office hours are scheduled for the weeks without training and members of the expert advisory board make themselves available to check in with participants, answer questions, and provide general feedback.

Stage two, Transition, lasts one month. Participants use this time to draft a preliminary commercialization action plan. They then gather for a full-day, in-person workshop, where they hone their plans and create commercialization roadmaps that they will use for the next year. At the workshops, participants also get time to interact with and connect with the investors who are part of the investor program, who work with the participants during the third phase.

The third stage of the accelerator program, Collaborative Implementation, lasts five months. During this time participants begin to implement their commercialization roadmaps with guidance and advice from program staff and advisory board members. They also meet with their investor mentors to gain expertise and insight into what they need to do to progress on their commercialization plans.

Though the Accelerator program has a structured format, the program is flexible. S2M takes a holistic approach to their program, working to meet the participants where they are, and to support them if they face challenges that could interrupt their progress. For example, S2M is flexible in working with their participants in a one-on-one manner, adjusting the program and tailoring it to help participants when they face obstacles such as moving, a death in the family, or the birth of a child.

The second prong of the S2M is AWIS Intentional Investing. This consists of a half-day session, held on the same day as the full-day, in-person meeting for Accelerator participants. This meeting hosts leading members of the investment community in each of the three locations. These leaders have a structured and confidential dialogue about the benefits of creating inclusive portfolios and their thoughts about investing in companies founded by STEM women. Facilitators share the research on bias in the investment process and offer evidence-based tools for cultivating diverse networks, mitigating bias in decision-making, and creating inclusive investment practices. These tools include:

1. ***The Network Assessment Tool***, which provides investors with techniques to reflect on gaps in their current networks and strategies for building greater diversity into their networks and deal flow.

2. ***The Founder Diversity Dashboard***, which allows investors to easily track founder diversity and rates of return across investment stages, over time making disparities more visible and empowering investors to address them and track progress.

3. ***The AWIS Intentional Investing Scorecard***, which offers investors a comprehensive framework for setting, assessing, and tracking intentional investing goals throughout every stage of the investment process, including network development, deal flow, pitch/proposal evaluation, diligence, funding decisions, ongoing founder support, cumulative portfolio review, and feedback mechanisms.

With these tools investor participants develop action items for addressing challenges individually and within their organizations.

Program Evolution and Changes

The program concluded its first year of programming in 2018 and the S2M team synthesized the lessons learned from the first three cohorts into an initial report: *Revolutionizing the STEM Entrepreneurship Ecosystem* (Association for Women in Science 2018). As of April 2018, all three cohorts had completed the first two stages of the program and had entered the Collaborative Implementation phase. AWIS reports that lessons learned from the first three cohorts will help the team implement changes based on the larger challenges they encountered in the program in year two.

Addressing Challenges

Program staff report that building trust and connection between participants in the Accelerator program has been the biggest challenge the program has faced. Since the program is virtual, it has been more difficult to build the "cohort" feel and establish trust between the participants. This has led to a reluctance between the participants to share their innovations or details about their products, as many of them are still in the early stages of development and say they are worried about protecting their intellectual property. This has led the team to think about hosting an in-person kick off meeting at the start of the program in addition to the in-person cohort workshop held at the end of the virtual curriculum. For year two, the S2M team has considered implementing this additional in-person kick-off meeting.

While the goal was to have a one-to-one ratio between investors and accelerator participants, the program had a difficult time getting investors to commit and show up to the event. As a result, the program has currently matched multiple accelerator participants with each investor participant and/or gatekeepers serving on the advisory board. The team is working to get more investors committed for the second year of the program, focusing on outreach and relationship building.

> "There are certain biases out there that men are more entrepreneurial than women, which I don't think is the case, but these are biases that we need to resolve. This group actually addresses those biases very successfully."
>
> - DC Cohort Member

Successes and Outcomes

The S2M program has recruited very diverse cohorts of STEM women. As can be seen below, 64 percent of participants in the
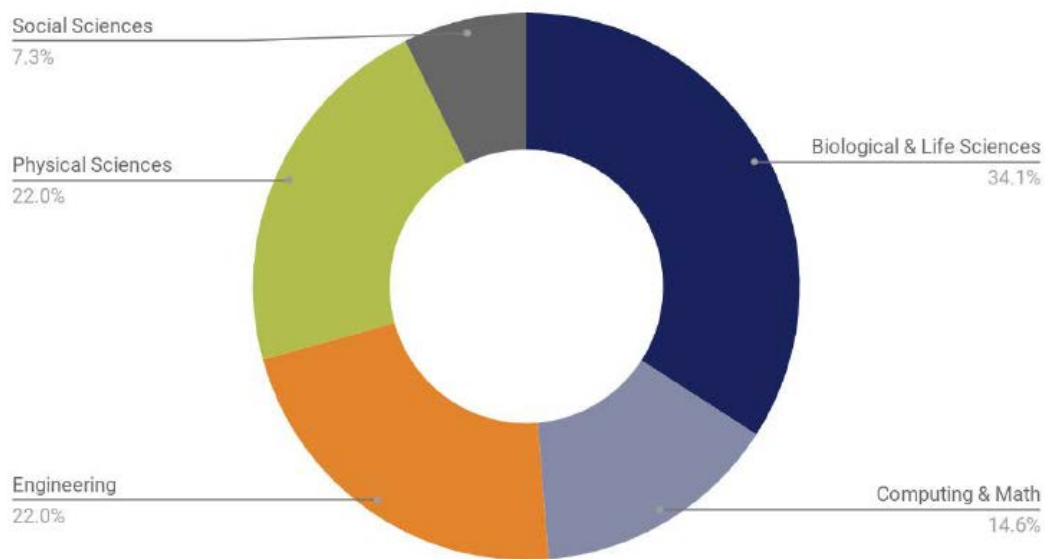
program's first year were women of color (Figure 1). Participants also represent 26 different STEM fields (Figure 2), and 33 percent already hold patents for their innovations.

Figure 1. Racial Diversity of S2M Participants: The AWIS Accelerator
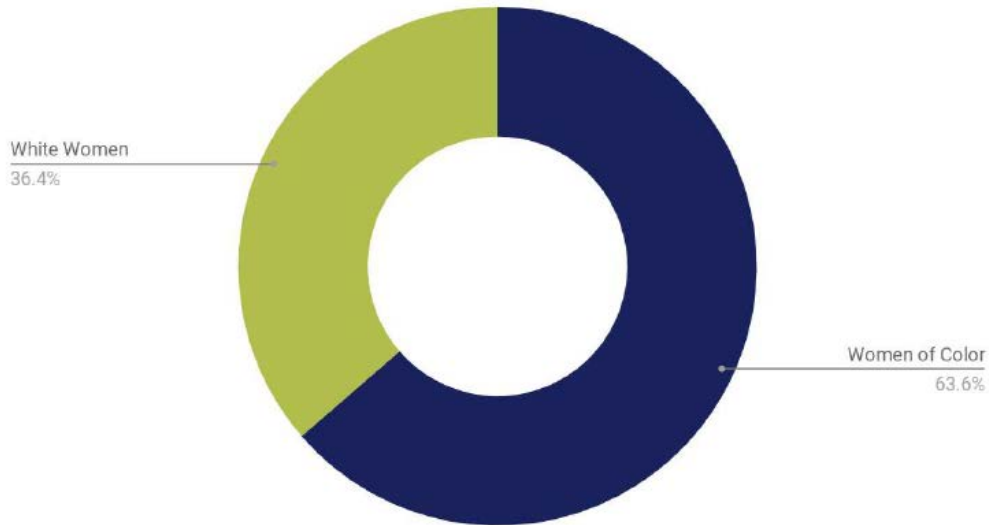
White Women
36.4%

Women of Color
63.6%

Note: Data represents participants from the three 2017-2018 cohorts.
Source: Association for Women in Science 2018.

Figure 2. STEM Fields Represented in S2M: The AWIS Accelerator

Social Sciences
7.3%

Physical Sciences
22.0%

Engineering
22.0%

Biological & Life Sciences
34.1%

Computing & Math
14.6%

Note: Data represents participants from the three 2017-2018 cohorts.
Source: Association for Women in Science 2018.

Future of the Program

The S2M is a two-year pilot program. The goal of the program is to take lessons learned from year one and apply them to year two and from there hone the program into an initiative that could be scaled up and launched nationally.

More information about STEM to Market can be found at: https://www.stemtomarket.org/.

Conclusion

Gender and racial/ethnic diversity in patenting, innovation, and commercialization is critical to developing cutting edge solutions to the nation's most pressing issues, yet more work needs to be done to ensure that the innovation teams creating these solutions reflect the diverse experiences and perspectives of the U.S. population. This report offers insights on strategies for developing and implementing programs that increase diversity in innovation by strengthening women's connections to networks that can facilitate patenting and innovation, improving their access to funding and capital, and ensuring that women have the information and resources needed to innovate and patent.

In developing and planning their programs, leaders said they spent considerable time and energy identifying and understanding their target audiences, assessing the kinds of partnerships and resources that would best serve them, and defining a scope of work that addresses key gaps in supports without duplicating existing efforts. The program leaders interviewed also emphasized the importance of securing the support of key stakeholders and establishing relationships with partners and other organizations within local communities. To garner support from stakeholders and improve the programs over time, many of the featured programs gather data on outcomes and feedback from participants. In addition, rigorous external program evaluations (potentially comparing different approaches) could also help ensure that stakeholders invest in initiatives that will contribute to closing the gender gap in patenting, innovation, and commercialization.

The programs featured in the report, however, often struggle to secure the funding to fully meet their programmatic goals. Almost all expressed a desire to add more staff members than they can currently afford. Greater investments from philanthropists, corporations, and other stakeholders would allow programs such as those profiled in this report to thrive and expand, increasing the diversity in innovation that is needed to effectively address the most pressing issues facing society today.

Appendix A: Additional Notable Initiatives

A number of programs that employ interesting approaches for increasing diversity in patenting, innovation, and entrepreneurship participated in the preliminary phone calls but did not meet the criteria for a full profile. More information about these programs can be found below.

Engaging Girls in STEM and Innovation

While investigating programs to feature in this report, IWPR encountered information on several additional initiatives that provide girls with exposure to innovation, inventing, and business development, which can help them envision a future as entrepreneurs.

For example, the B~Stem Project helps girls engage, learn, and grow in business and STEM disciplines across industries (B~STEM Project 2018). The organization runs a variety of programs and events across the United States to introduce girls and young women to technology, innovation, and business ideas at an early age. The B~STEM project runs programs with support from various corporate partners such as Microsoft, Google, Samsung, and Robert Half Technology, among many others.

Some programs that are not traditionally geared toward girls have been working to ensure that they become more gender balanced. For example, since 1990 the USPTO has been running Camp Invention, a one-week program for children in grades 1-6 that is offered through local school districts across the United States and typically costs about $200 per student. The program explores the connection between science, technology, engineering, and innovation, and introduces students to the idea of intellectual property. Camp Invention has begun to work on marketing to increase the number of girls who participate. The program also provides scholarships to help ensure it is accessible to all children. In 2017 alone, through partnership with companies and other funders, Camp Invention provided $42,000 in scholarships.

Gender Equity in Inventor Recognition & Awards

One way that innovators gain recognition for their work is by entering competitions and winning awards. This validation can help attract the investors and support needed for innovators to take their ideas to market. Ensuring gender parity in these competitions is a large part of addressing the gender gap in patenting and commercialization.

MN Cup, the largest startup competition in the United States, has supported 13,000 startups and awarded more than $2.4 million in seed money to startups in Minnesota since 2005. Recognizing that its participants did not come from diverse backgrounds, MN Cup began tracking their demographics and found that of those entering the competition, only 25 percent were women, and 10 percent were people of color. To increase the diversity of its applicants, MN Cup decided to increase the diversity of the judging and mentor pools, start programming geared toward ensuring that women progress through the process, and introduce specific sub-categories to lift up women- and minority-led innovation teams. Since these changes were implemented, the participation of women in the competition has risen as high as 39 percent.

The **AAAS-Lemelson Invention Ambassadors Program** also went through a similar process after noticing that the first cohort of Ambassadors was dominated by White men. The AAAS-Lemelson Invention Ambassador program was started in 2014 to "celebrate and highlight the importance of invention and inventors" (AAAS 2018). Its initial ambassador cohort of 6 individuals included five White men and one White woman. Since then, the program has increased diversity among its ambassadors, and many of the ambassadors have used their one-year term to speak about issues of gender and inclusion in innovation.

Gender Equity in Innovation and Patenting in the Corporate Sector

When looking for corporations that actively focus on addressing the gender gap in patenting among their employees, IWPR reached out to companies listed in Martínez, Raffo, and Saito's 2016 *The Gender of PCT Inventors* report (published by the World Intellectual Property Organization) as having the most gender-balance in patenting, and conducted three interviews with individuals from IBM and Proctor & Gamble. While neither corporation had a specific program designed to address the patent gap in innovation and patenting within their companies, they both provided insight into strategies that can help corporations trying to address this issue within their own organizations.

First, an innovator at IBM said that corporations should make the process of submitting innovation ideas for potential patents open and easily accessible to all employees, and this process should be shared widely throughout the corporation. While IBM has formal invention development teams to which inventors must present their ideas, anyone is allowed to submit their ideas to the review board that listens to and rates each one. IBM also creates a network of internal mentors that any employee can work with on their innovations if they are a new inventor. If the review board feels an innovation warrants advancement, they will get the patent filed on their employees' behalf. IBM also gives awards and internal recognition to their employees for filing patents and ensures that all employees know, regardless of their position, that everyone has equal opportunities to submit ideas.

The interviewees also noted that corporations should work to ensure that progress is being made on getting women into technical and research and development roles through strategies such as reexamining hiring and promotion practices and providing mentorship and women-led networks for female employees. For example, Proctor & Gamble has been running two programs specifically focused on their female employees. Experienced Women in Research and Development (EWORD) is a program for women at the Director level and above that focuses on ensuring that the company has the right environment for women to succeed and advance in R&D. Women in Innovation (WIN) focuses on ensuring that mid-career women in the company have the skills they need to move to the next level in their careers. Though not specifically focused on innovation and patenting, such programs are designed to help women advance in technical roles, which can increase their likelihood of engagement in innovation and patenting.

Appendix B: Program Leader Interview Protocol

Program Development

1. Can you please tell us who you are and what you do for the program/initiative?

2. When was the program/initiative started?

3. What was the impetus for beginning the program? Why did you feel this program was needed?

    a. What were the main issues you hoped to address by starting this program?

    b. Why did you feel that a program addressing (issues mentioned above) was most needed?

4. Who were the key individuals who worked to get the program up and running?

5. What were the biggest obstacles to getting the program started?

    a. Did you/how did you overcome those obstacles?

6. What helped you most in setting up this program? What allowed you to do it?

7. Where did you get your initial funding for the program?

Program Details/Day-to-Day operations

8. Who is the target audience for the program?

    a. Faculty, students, graduate students, professional women, women in STEM, entrepreneurs, inventors, etc.?

9. What are the demographics of your participants?

    a. Income, age, education levels, women, women of color, etc.

    b. Is the program co-ed? Or is it for women only?

10. How is your program structured?

    a. How many week/months is the program? Is there a formal start and end to the program?

    b. Are there formal cohorts? If so, how many do you have per year and how many participants per cohort?

    c. How do participants progress through the program?

    d. What (if any) types of mentors does the program have?

    e. Are participants working in teams or alone?

    f. Does your program work with investors in addition to individuals? If so, what does this look like?

11. How many participants have you served in the history of the program?

12. Is there a strong connection with alumni of the program? Do you do anything active/formal to maintain an alumni network?

13. What are the key topics or themes or activities that are covered in the program?

14. Do you use a formal curriculum?

    a. If so, is it something you developed internally? What is it based on? Would you be willing to share it with IWPR and/or others?

    b. Has your curriculum changed? If so, how?

    c. How do you structure your curriculum/topics?

    d. (If no) Why did you choose to/not to use a structured curriculum?

15. Where does your current funding come from?

    a. If it has changed, why?

    b. Has your funding increased or decreased over the years?

    c. Has it been difficult to secure funding?

16. Has your program changed since its inception?

    a. If so, how is it different (e.g.. has it grown/shrunk? Has the target audience changed? etc.)?

    b. Has the underlying mission/guiding philosophy of the program remained the same? If not, how has it changed?

    c. Why did you make these changes?

17. If your program is co-ed: do the women who go through the program have different experiences/report that they get different insight from the program than the men?

18. What are the biggest challenges in operating the program?

19. What are the resources, supports or circumstance that made this program work well?

20. Do you experience challenges in getting participation in your program? If so, what are the challenges?

    a. If the program has both women and men, has it been easy or difficult to get women to participate?

    b. Are there challenges to getting women of color to participate?

    c. How are you addressing these, or if you are having success at recruiting women and people of color, how are you doing it?

21. What have been your biggest successes?

22. What is your relationship to (the university/larger organization/government) like?

    a. Has there been active support? If so, what does that look like?

    b. Have there been any challenges? If so, how have you addressed them?

23. What has been the biggest surprise (e.g. something you did not see coming, a surprising outcome or story)?

Results

24. What has the data been telling you about the success of your program?

25. Do you have data evidence that your program has had a positive impact on getting more women to innovate or apply for/securing a patent?

26. What aspects of the program have been most responsible for the participants' success – eg. Networking, learning about a specific process, etc.).

27. Is there anecdotal evidence that your program has been making an impact? Please share an example.

28. Reminder to have the program share any/all program and outcome data.

Future of the Program

29. What do you envision for the future of the program?

    a. What (if any) changes will there be?

    b. What would you do if you had unlimited funds to expand or enhance your program?

30. Do you think your program could be an example for other programs or be replicated in other settings? Why or why not?

31. Could your program work on a larger scale? Why or why not?

32. What is the one thing you would tell someone who is trying to start a program like yours?

33. Is there anything you would recommend to women who are interested in inventing/becoming entrepreneurs?

34. What impact do you think it would have for women and for society if more women invented, patented, and commercialized their inventions?

35. Do you have any photos of the program that you would be willing to share for possible publication in the report?

36. Who is the appropriate contact to publish in the report?

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