What Are We Missing?

Rethinking Public, Private and Nonprofit Strategies to Advance Women in Technology

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ABOUT & AUTHORSHIP

This report is an outcome of the event **What are we Missing? Rethinking Strategies to Advance Women in Technology** (the conference), which was hosted by the UCLA Luskin Center for Innovation and the UCLA Office of Information Technology on April 30, 2015. The report is divided into four main sections, starting with an introduction, then a literature review of a wide range of strategies to advance women in technology, recommendations for further research, and an appendix that includes a summary of the conference.

The literature review was authored by Rebecca Sadwick, Sophie Mako Tanaka, and Adina Farrukh of the UCLA Luskin Center for Innovation. The summary of conference findings was authored by Rhianon Anderson and Kiana Taheri, with editing by Rebecca Sadwick.

The bios below list both past and present affiliation. All work was done when the authors were with the Luskin Center for Innovation.

Rebecca Sadwick is the Digital Technologies Program Manager for the UCLA Luskin Center for Innovation. She also serves as Director of Marketing for GoGuardian, an education technology company providing device management software to schools. Rebecca's prior work includes research on the effects of teacher tenure on K-12 education, youth Internet safety, and the role of merit-based teacher pay on student outcomes.

Sophie Mako Tanaka was a researcher with the UCLA Luskin Center for Innovation's digital technologies initiative. She is now a researcher for the Social and Identity Lab a UCLA and the Chief of Marketing and Finances for the Undergraduate Research Journal of Psychology at UCLA. Sophie's prior work includes research into the relationship between women's mindset, stereotype threat vulnerability, and perceptions of STEM.

Rhianon Anderson was a researcher for the UCLA Luskin Center for Innovation. She is now the Executive Director of the Congressional App Challenge, a nationwide congressional initiative aimed at engaging high school students in coding and STEM. She holds a Master's in Public Policy from UCLA, where she focused on technology policy.

Adina Farrukh is an analyst at Analysis Group, an economic consulting firm. She has worked as a researcher for the UCLA Luskin Center for Innovation, and holds a B.A. in History and a Masters in Public Policy from UCLA.

Kiana Taheri is a Bohnett Fellow in the LA Mayor's Office, and formerly a researcher with the UCLA Luskin Center for Innovation's digital technologies initiative. She is currently completing a Masters in Public Policy at the UCLA Luskin School, where she has specialized in science, technology and innovation policy as they apply to equity, diversity and social change.

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Disclaimer

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CONTENTS

INTRODUCTION AND SIGNIFICANCE

Women's representation in the American workforce has steadily and consistently increased throughout recent decades. In 1930, women comprised 30 percent of the American workforce (Khan, 2002), and 5 percent of medical degrees earned. Both figures are now at roughly 48 percent (Khan, 2002; "Measuring Women," 2012). Though women have achieved proportional representation in the American workforce—and in many other nations worldwide, they are still significantly underrepresented in executive and other leadership positions. In nearly all industries—including law and medicine, which are lauded as examples for the technology industry to follow for their transition from male-dominated to proportionally balanced—women are highly concentrated in entry to mid-level management positions. In 2013, women comprised 45 percent of all law associate positions, but only 19.9 percent of partner positions ("Women in Politics," 2013). Among the 200 largest law firms, only 4 percent of the managing partners were female.

Women now comprise 47 percent of the overall American workforce (Khan, 2002)—and have come to be more proportionally represented in traditionally male-dominated fields including law and medicine. The paradigm shift toward embracing women as assets to the workforce characterized much of the feminist movement of the 1970s, and was successful by many measures. Overt discrimination on the basis of gender and other demographic factors is now explicitly illegal in most developed nations, which has aided women's rise into fields previously dominated by men.

Despite the fact that "many people believe there is such a thing as a 'male brain' and a 'female brain,'" said Dr. Lise Eliot, who led a 2015 study analyzing hundreds of MRI brain scans at Rosalind Franklin University of Medicine and Science, data indicates otherwise. Dr. Eliot's team found no difference in the way male and female brains store short and long term memory, and emphasized that numerous other studies have found no differences in the cognitive aptitudes of male or female brains (Reynolds, 2015). Male and female brains were also once thought to have significant differences in the way their hemispheres process language and mathematical concepts, but "large scale meta-analyses have debunked both of these claims" (Reynolds, 2015).

As economists and researchers can attest, gender disparity in one of the most profitable and rapidly-growing fields is not simply a "women's issue." There is a significant body of evidence showing that more diverse companies are more profitable. Further, losing the potential contributions from half of the workforce because of systemic factors and biases that exclude and disenfranchise them carries economic and societal repercussions.

Despite the attention given to the issues causing a dearth of women and minorities in technical and executive leadership positions, no progress in their representation has been made in the United States since the early 1990s. There is considerable, and widening, disparity between the number of men and women who study computer science in college, with the proportion of women holding computer science degrees dropping from 23 percent to 18 percent in the last 10 years (National Student Clearinghouse Research Center, 2015). The concentration of women in entry to mid-level positions is typical of the technological sector as well, though women only account for a mi-

nority of this field. Notably, while a pay gap of 34 percent between men and women with comparable qualifications in identical positions exists nationwide, the pay gap in the tech sector is 12 percent. This indicates that compensation is not likely a deterrent for women in tech, highlighting the significant effects of the systemic factors that contribute to the gender equity in the tech sector hold.

Ironically, while the tech industry epitomizes innovation and progress, it has some of the most asymmetrical representations of women and minorities of any industry in the United States. Despite recent efforts to address the diversity gap by corporations, high-profile non-governmental organizations (NGOs), and the public sector, women's representation in technical and executive leadership roles has not improved since 1991 (Guglielmo, 2015).

In the context of this report, the phrase "Women in Tech" refers to any woman or group of women working in Science, Technology, Engineering, or Mathematics professions. This includes: women in technical fields within technical companies; women in highly technical fields in non-technical organizations; as well as women in non-technical roles within highly technical companies.

What should be done?

To answer that question, UCLA's Luskin Center for Innovation and Office of Information Technology convened 250 influential leaders in the public, private and nonprofit sectors for a conference on April 30th, 2015.

The conference explored strategies to reduce inequality in the tech sector, which fall into three main categories: personal, private, and public. Rather than focusing on personal strategies that place the onus of cultural change on individuals, UCLA's conference focused on private and public strategies to foster systemic change. Private strategies include policies or processes implemented by private organizations to improve their own culture and outcomes in terms of gender equality. Public strategies encompass a broader category that can include social movement/large-scale public dialogue aided by social media, non-profit initiatives, government initiatives, public-private partnerships, and public policies.

The conference and our research have yielded a list of key strategies, but also underscored gaps in existing practice and research. The gaps in existing knowledge and research are particularly prominent with public sector strategies, identifying an opportunity to inform more proactive approaches in this sector.

This report comprehensively explores private strategies that successfully advance women across companies of all sizes; it also discusses as a range of strategies within the public domain—including the role of government—which offer critical pieces of a holistic strategy for change.

Executive Summary

Strategies to advance women and minorities in tech can be taken by key stakeholders within the corporate, private, and nonprofit sectors. This report delineates promising strategies and research across all sectors, as well as the intersection of many key strategies across sectors and stakeholder groups.

The following recurring themes and insights emerged from a survey of extant literature and crowd-sourced knowledge from UCLA's conference:

1.Using data to assess diversity

Assessing diversity metrics about the number of women and minorities employed in technological and leadership positions within a company—and tracking progress as new strategies are implemented—is paramount in determining each organization's unique needs. Companies can assess existing biases using data collected from employee interviews, surveys, and focus groups; these tactics are most effective when data is anonymized. Coupling qualitative and quantitative data is more likely to yield metrics in context, painting a more representative picture of the situation within each company (Bebbington, 2002).

Once a company begins collecting data, transparency and public accountability can further its efforts to augment diversity (Ann, 2015; Gilpin, 2014). eBay and Google, for example, release their diversity data both internally and publicly, stating that "transparency demonstrates commitment and conviction" (Angier & Axelrod, 2014).

Disaggregating figures by department—and comparing against company standards and averages—can hold managers and/or groups accountable for their hiring and promotion decisions. Evaluating the impact each strategy has on the company provides direction for the future of each organization's diversity initiatives.

2. Providing female entrepreneurs with access to funding models that reduce bias

Female-run ventures receive just 3 percent of all venture capital (VC) funding, though companies with female CEOs are most prevalent in software and biotech (Brush, Greene, Balachandra, & Davis, 2014).

Studies on unconscious bias indicate that women who present identical content as their male counterparts at traditional VC pitches are often viewed as less competent and as having less innovative or viable concepts (Brooks, Huang, Kearney, & Murray, 2014). However, venture capital firms with at least one female partner are three times more likely to invest in companies with a female CEO (Brush et al., 2014).

Still, 77-79 percent of American VC firms have never had a single female partner (Schubarth, 2015). Further, the fact that the number of female partners in venture capital firms has declined in the last decade, from 10 percent in 1999 to 6 percent in 2015 (Brush, et al., 2014), indicates a regression in diversity that also characterizes the tech sector.

Because women are disadvantaged by traditional funding models, providing alternative access to capital can promote their opportunity in tech entrepreneurship. Blind applications and those that specifically target women for investment or mentorship can counter the disadvantages women traditionally face within the startup-funding pipeline.

3. Focusing on the hiring process

Studies show that women are often disadvantaged (through conscious and unconscious biases about their ability) at all stages of the hiring process—from résumé screenings to assessments of their performance in interviews (Caleo & Heilman, 2013). Companies can avoid these disparities by structuring the hiring process in a way that is clear and transparent, with set criteria and questions through which each candidate is evaluated. Avoiding ambiguity at this stage includes deliberately structuring candidate interviews and evaluative criteria, and often includes anonymizing résumés during the screening process.

Companies can also expand their recruiting practices to attract women who have taken nontraditional paths to earn comparable technical expertise, being mindful that the education pipeline often disenfranchises women who have the aptitude and interest to pursue technical fields. Some companies even break from the traditional hiring model by asking applicants to submit mock assignments that mirror tasks they would be expected to complete within a position, judging candidates solely on the quality of their work rather than educational background and work experience.

4. Standardizing performance reviews

The impacts of subconscious biases and personality-based competency assessments on performance reviews can be mitigated by establishing clear criteria about whether specific job expectations were met. When performance review criteria are not standardized to evaluate specific job functions, women are more likely than men to be assessed based on their personalities rather than actual job performance. (Gardner, 2016). Fortune magazine's 2014 analysis of 248 performance reviews at 28 companies found that men were critiqued for their personalities in only two of 83 critical reviews, while women's personalities were critiqued in 71 of 94 critical reviews (Fortune, 2014).

5. Increasing quality mentorship

Access to professional mentorship—a mentorship where mentors help their mentees keep in touch with the "right people" and provide advice related to overcoming business challenges as a woman—is critical for the retention, advancement and satisfaction of women in tech (Welle & Heilman, 2005). The need for formal mentorship is especially relevant to women, who may not have access to male-dominated social networks because informal mentorships tend not to cross gender lines.

6. Expanding public-private partnerships

Companies can partner with and support organizations that promote diversity in the technology industry, which can include collaboration between private companies, judicial or legislative agencies. For example, Intel intends to increase females in game development through contributions to the International Game Developers Association Foundation (Vara, 2015). Additionally, Twitter has sponsored and partnered with organizations that advance women and minorities in technology, such as the Girls Who Code and Girl Geek Dinners organizations (Linshi, 2014).

TechNet and Engine are among the Washington DC-based non-profits that advocate for public policies that foster innovation (including diversity) in the tech sector. Private and nonprofit organizations such as TechNet and Engine advocate for state and federal policies that foster more inclusive and equitable work environments, and provide resources for policymakers looking to introduce such legislation.

The U.S. Department of State's "TechWomen" initiative brings female leaders in Science, Technology, Engineering and Mathematics from Africa and the Middle East to Silicon Beach for mentorship, networking, and professional development. Furthermore, the Obama Administration has launched numerous task forces aiming to advance equal pay and opportunity for women in the workforce. The Equal Pay Task Force and the White House's "Startup American Women" programs cater to women in both entrepreneurship and corporate positions.

7. Building upon mandate-driven public policies

Public policies can do more to fund, regulate, and incentivize equitable workplace policies.

Globally, both normative and economic factors have been cited in the discussion of the public sector's role advancing women in technology. Some government programs such as California Competes, sponsored by the California Governor's Office of Business and Economic Development, offer income tax credits to businesses that meet certain diversity objectives.

The government's integral role in supporting K-12 schools and public institutions of higher education give it the opportunity to implement programs for students and professional development resources for teachers to combat the disenfranchisement of women and girls along the STEM education pipeline. Local, state, and federal scholarship and grants to pursue higher education can also encourage women and minorities to pursue STEM fields, countering some of the systemic factors that often exclude them from requisite classes, programs, and internships for careers in tech.

Public sector strategies in the United States remain more limited than other developed nations, especially compared to European nations with mandated diversity quotas, name-blind application processes, and formal institutions that foster diversity. The expansion of flexibility family leave policies (including maternity, paternity, and family leave policies) is correlated with more equitable pay and involvement in the workforce.

Public mandates need cooperation from the private sector in order to be effective. When British Prime Minister David Cameron announced plans to promote name-blind job applications, he relied on partnership from the civil sector and private companies that voluntarily agreed to implement them. Thus, conversations about the need to expand public mandates must include buy-in from the organizations that will be impacted by such policies.

8. Commitment to diversity at all levels of leadership

Leadership that explicitly acknowledges the benefits of a diverse workforce may significantly impact company culture surrounding diversity (Finney, 2014) Top-down commitment to diversity at all levels of leadership can ensure organizations are inclusive and fair in their hiring, compensation, promotion, and performance review processes. The decision to allocate company time and resources to redesigning hiring, compensation, promotion, and performance review processes and offering diversity training to employees often must be made at the executive level. However, ensuring these initiatives are successfully implemented relies on buy-in from employees in middle-management positions.

Gender diversity within leadership roles is often as limited as it is in technological roles, which can limit the success of company-wide diversity initiatives. Companies can make it a priority to hire more women for managerial roles (Tapia & Kvasny, 2004) or expand search criteria to include women with desirable skills (rather than strictly executive leadership experience) for positions on a board of directors (Ann, 2015).

Strategies to Recruit and Hire Women in Tech

The technology industry's reputation as a male-dominated field is one of the primary reasons young women are deterred from pursuing a technical career (Google, 2014). Pop culture's depiction of women in technical fields is currently informed by stereotypes of women as "helpless without a male counterpart" or as "passive, admiring observers" (Forrest, 2014; Jackson, 2010). Starting in childhood, companies can use mass media to boost the image that a career in the tech industry is one that both girls and boys can pursue. An example of such an initiative is Google's recent partnership with Disney–ABC to create female characters who pursue computer science (della Cava, 2015). Google's support to Disney-ABC ranged from advice about creating relatable computer scientist personalities to assistance in writing code sequences that would transfer well onto the small screen. In addition, Google, in partnership with the Entertainment Industries Council (EIC) and the National Center for Women in Technology (NCWIT), recently awarded the first SET (Science, Engineering and Technology) Award For the Portrayal of a Female in Technology in May 2015 ("SET Award," 2015).

Revise job-advertising techniques. Often, the first recruiting challenge lies in getting qualified women to apply to jobs (Wadhwa, 2015). By analyzing the recruitment process, companies can advertise open positions that appeal to both men and women in the following ways:

- Ensuring that job descriptions sound inclusive of all potential applicants. Masculine wording in many job descriptions often deters women from submitting applications (Williams, 2014) because they are less inclined to believe that they will thrive in such positions (Gaucher, Friesen, & Kay, 2011). Additionally, Vivek Wadhwa, technology entrepreneur and accomplished academic, states that descriptions with very long lists of required skills should be avoided because women are less likely than men to apply for positions when they do not have every required skill on the list, despite the fact that some required skills can be learned on the job (Wadhwa, 2015). Therefore, Brooke Hunter of Engine suggests that companies consider adding a disclaimer to their advertisement to clarify that not all skills are required. It is also important for employers to conduct a comprehensive job analysis in order to fully understand which skills are truly essential for an open position (Welle & Heilman, 2005). Researchers from Harvard University and New York University warn that "vague personality characteristics" may lead to inadvertently gendered descriptions, and that job analyses should focus on revealing specific behaviors, skills, and experiences that are crucial for any individual to be successful in a given position (Welle & Heilman, 2005). Furthermore, active expression of interest in attracting a wide-range of applicants communicates to potential employees that diverse teams are important to the organization (Editors, 2014).

- Prospective applicants frequently peruse the company's website to gain insight into the organization's culture (Braddy, Meade, & Kroustalis, 2014; Walker, Feild, Bernerth, & Becton, 2012) before deciding whether to take a job. Thus, companies would do well to ensure that the company's website presents an

inclusive company culture. Kathryn Finney, founder of "digitalundivided," warns technology companies to be mindful of their online branding, and suggests that companies display diversity within their top level executives on their website to avoid creating an "appearance of exclusion" (Finney, 2014). In addition, companies can provide "hard data" proving that the firm treats women fairly by surveying a sample of their own female employees and asking them directly about their experiences (Sullivan, 2014). Surveying employees anonymously is more likely to yield data that reliably depicts the work environment.

Expand targeted recruiting. Traditional practices of recruiting from elite schools decrease diversity by limiting the candidate pool to graduates of such elite schools, who tend to be mainly white, upper-middle class students for a variety of socioeconomic reasons (Simard & Gammal, 2012). Companies can therefore expand their prospective candidate base and reach more talent by branching out to a more diverse range of schools (Craig, 2015; Finney, 2014; Wadhwa, 2015) and recruiting from technology conferences that cater to women (Wadhwa, 2015).

In addition, companies would benefit from lessening their emphasis on factors like GPA, which does not necessarily predict long-term success and may be more reflective of socioeconomic advantages, in favor of other indicators that showcase problem solving ability and leadership skills (Craig, 2015; Simard & Gammal, 2012). For example, Menlo Innovations, a software design start-up, instituted a hiring process that catered to their specific needs: employees that could program in pairs. Therefore, their hiring process was designed to test candidates' ability to think and solve problems in a team setting (Simard & Gammal, 2012). By placing an emphasis on people with certain skills rather than on people with certain credentials, technology companies can reach a more diverse hiring pool, one that shifts its focus away from graduates from top computer science programs and instead seeks to add employees with diverse technical skills (Editors, 2014).

Companies can also expand their recruiting practices to attract women who have taken nontraditional paths to earn comparable technical expertise. There are numerous training programs and coding academies that cater exclusively to diverse communities, such as CODE2040 and the Flatiron School. These programs offer networking opportunities for companies to meet with and consider hiring their graduates (Editors, 2014). Etsy, for example, partnered with 37Signals and Yammer to cover women's living expenses for a three-month Hacker School session (a free coding training program in New York). In so doing, Etsy increased its female engineers by 500 percent (Kamenetz, 2013).

Revitalize the hiring process. Numerous studies have shown that women are often disadvantaged (through conscious and unconscious biases about their abilities) at all steps of the hiring process—from the résumé screening to phone and in-person interviews. Companies can mitigate these concerns by:

- Instituting a blind résumé screening process (Williams, 2014), and having candidates assessed and ranked separately by hiring team members to avoid biases caused by group dynamics (Simard & Gammal, 2012; Sullivan, 2014). Alternatively, companies can institute a blind interview process, wherein candidates have to pass an open-ended analytical challenge before proceeding onto the interview. One startup, GapJumpers, has developed technology that enables companies to do just that—preliminary evaluations showed that once the blind challenge was completed, the gender breakdown of new hires was 58 percent women and 42 percent men (Porter, 2015). This initiative is also likely to shift the focus away from credentials, to assessing candidates based on actual skills.

- The impetus for a blind screening process can come from either the public or private sector, or a joint effort from organizations within each. For example, British Prime Minister David Cameron announced in October 2015 that the civil sector and companies like HSBC and Deloitte would partner to explore the impact blind applications have on diversity in the workforce. This experiment is incentivized by the government but implemented voluntarily by participating companies.

- Structuring the hiring process so that it is both clear and transparent (Tapia & Kvasny, 2004). For example, research on salary negotiations suggests that women would be as likely as men to negotiate their salaries in an application process where the rules of compensation negotiation are concretely established – this can be as simple as including the phrase "salary negotiable" on job descriptions (Leibbrandt & List, 2012). Furthermore, supervisors making hiring decisions can be held accountable for their choices by being required to describe and justify their decisions (Welle & Heilman, 2005). Welle and Heilman state that this accountability would lessen the ambiguity within hiring processes, as well as decrease discrimination against women.

- Making it mandatory for hiring personnel to interview at least one woman and one minority (Wadhwa, 2015). Wadhwa, the aforementioned entrepreneur and academic, explains that interviewing at least one woman for an open position would help ensure that the hiring pool is diverse. Wadhwa compares this to the "Rooney Rule" for National Football League teams, a diversity measure that requires teams to interview minorities for high-level positions.

- Ensuring that the hiring team is itself diverse (Ann, 2015; Fairchild, 2015; Simard & Gammal, 2012; Simard, 2010). Hiring committees that have at least one female member may increase the likelihood of a female candidate being hired as well and increase the likelihood of a female candidate accepting a job offer (Wadhwa, 2015). Research has shown, that the gender, age, and position of the person making the initial recruiting call has a significant impact on whether the call results in a successful hire. Companies can take this step further, especially in executive-level hires, by having someone at the same level as the open position make the initial recruiting call (Sullivan, 2014).

- Expanding diverse hiring practices to include hiring women at all levels of a company's leadership ranks. Companies can make it a priority to hire more women for managerial roles (Tapia & Kvasny, 2004) or follow Symantec's example and expand search criteria to include women with desirable skills (rather than strictly CEO experience) for positions on a board of directors (Ann, 2015).

- Redesigning the hiring process altogether—to remove résumés from the application process and ask for a series of assignments that are evaluated without names attached—is gaining traction by forward-thinking companies in the United States and Europe. Focusing on the applicants' ability to meet a standard set of criteria—rather than alma mater or past work experience—is thought to counter many of the confounding sets of unconscious biases that can affect women and minorities throughout their lives (Feintzeig, 2016). This process removes the subjective and often bias nature of the interview process—namely, the tendency for hiring managers who prefer interacting with people who share a similar background—and focus solely on professional aptitude required for a position.

Strategies to Retain and Advance Women in Tech

Start from the top. Research shows that having a diverse leadership is a primary concern for the retention of underrepresented men and women in technology (Simard, 2010). In addition, leadership that explicitly acknowledges the benefits of a diverse workforce may significantly impact company culture surrounding diversity (Finney, 2014). Finney notes that company leadership has options as to how they go about announcing support for diversity, and she points out that an easy way to show support is to have a leader post on a company blog about why diversity is valuable to him or her and how diversity betters the company. In addition to recognizing the benefits of diversity, executives can ensure that diversity initiatives are supported by executives and senior employees who have the authority to make decisions and set the tone for the company (Ann, 2015; Fairchild, 2015; NCWIT, 2011). Such individuals can make a business case for diversity by setting clear and measurable diversity goals and explaining how increasing diversity will contribute to reaching business goals. They can also assign responsibility for achieving these goals and promote the ongoing evaluation of progress (NCWIT, 2011).

Ensure greater flexibility. Research suggests that implementing flexible practices is especially important for the retention of women in technology (Simard, 2010), though men in the sector cite an increasing emphasis on flexible time for personal and family obligations. Companies can work with their employees to create flexible schedules that accommodate both personal and work responsibilities (Feyerherm & Vick, 2005). This flexibility can take many forms, including telecommuting for those whose work can be accomplished remotely and part-time hours or compressed work weeks for others (Simard, Henderson, Gilmartin, Schiebinger, & Whitney, 2010). In addition, companies can accommodate employees who need to take a break from work by providing flexible off-ramping and on-ramping policies when employees take and return from family or medical leave (Ashcraft & Blithe, 2010; Hewlett et al., 2008; NCWIT, 2011; Servon & Visser, 2011). Additionally, Simard (2010) recommends that companies foster a "flexibility culture" by having the company leadership model these types of flexibility in their own workload – this will send the message that working part-time or telecommuting is acceptable and will not impede career advancement. Leadership may also promote a flexible work environment by publicly supporting employees that practice flexible work habits (Ann, 2015).

Diversity and Harassment workshops. Women and minorities are known to face both macroaggressions (overt and frequent discrimination and prejudice), and microaggressions (covert slights related to gender or other minority identity that can be frequent or infrequent) in the workplace, which can lead to employee turnover in even highly inclusive organizational cultures (Simard & Gammal, 2012). Companies can therefore offer workshops to help employees understand how their daily comments and actions can either advance or hinder a more inclusive company culture. Such workshops would ideally include training on how to be more self-aware of unconscious biases and how to overcome them, as well as training about recognizing and preventing sexual harassment ("Bit by," 2003; Craig, 2015; Devillard, Sancier-Sultan, Werner, Maller, & Kossoff, 2013; Gammal & Simard, 2013; Simard, 2010; Tapia & Kvasny, 2004; Van Huysse, 2014; Williams, 2014). These workshops can train employees to "actively counter" any kind of behavior that may be interpreted as demeaning to women and other minority groups. Google, for example, has reported that their "Unconscious Bias @ Work" workshops have been fairly effective in making the 26,000 Googlers who participated to be more aware of their actions and make steps to overcome their biases (Bock & Welle, 2014). Companies can work with social scientists or take advantage of the evolving research in this area to design these workshops. Finally, in order to make diversity training more effective, some scholars recommend that the workshops be optional and that they focus on encouraging appropriate behavior rather than threatening inappropriate behavior (Dobbin, Kalev, & Kelly, 2007).

Formalized mentoring programs. Studies have shown that access to professional mentorship—a mentorship where mentors help their mentees keep in touch with the "right people" and provide advice related to overcoming business challenges as women—is critical for female retention (Carter & Silva, 2010; Feyerherm & Vick, 2005). Despite the potential for formalized mentorship programs to be less satisfying than informal or "organic" mentorships, Welle and Heilman explain that formal mentorships improve workforce satisfaction (Welle & Heilman, 2005). This is especially relevant to women, who may not have equal access to male-dominated social networks. Therefore, having a formalized mentoring program where women are matched to mentors (e.g. female senior employees) and mentoring is built into performance evaluations is likely crucial for retaining and advancing women in technology (Angier & Axelrod, 2014; Cordova-Wentling & Thomas, 2007; Lomas, 2015; NCWIT, 2011; Simard et al., 2010; Tapia & Kvasny, 2004).[1]

Networking opportunities and employee resource groups. Research recommends that technology companies utilize networking opportunities to retain diversity. According to data,   women and underrepresented minorities in technology companies are very likely to report that networking opportunities are important to their retention and advancement (Simard, 2010). Companies can offer networking opportunities specifically for women in technology as a way to encourage women to "connect with one another, both in groups and on a one-on-one basis" (Anderson et al., 2013).

Additionally, companies can sponsor workshops, conferences, and other group events that focus specifically on the barriers women technologists face and how others have overcome them. Such initiatives have shown to increase female employees' sense of "job embeddedness," which is a crucial requisite for retention (Gammal & Simard, 2013).

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1 The role gender-matching plays is not entirely clear, though some studies suggest that tech companies may benefit from gender-matching in regards to encouraging mentoring programs (Lockwood, 2006).

Overarching Strategies

Increasing diversity in the technology industry requires efforts to counter the systemic inequities that fail to attract, retain, and advance women. This report outlines several strategies that technology companies can adopt in their diversity pursuits. Although these policies and practices have demonstrated potential to create meaningful change, they will likely be most effective if companies have a clear idea of the goals they hope to achieve, track progress quantitatively, and hold people or groups accountable for progress (Caitlin, 2014).

The first step to take before undertaking any diversity initiative is assessing baseline diversity levels and metrics. Companies can assess certain aspects like existing biases using data collected from interviews and focus groups. Once the baseline metrics are established, companies are more concretely able to identify the diversity problems they face. From there, companies can establish concrete goals to increase diversity. Inherently, this will be an iterative process for most companies, who may need to practice a trial-and-error approach until they are able to develop a system that successfully interrupts biases (Editors, 2014). These tactics are especially significant because editors at Model View Culture note that despite performance metrics being a priority at technology companies, diversity metrics often go overlooked (Editors, 2014). Thus, they encourage companies to prioritize discussing, measuring, and communicating diversity metrics.

Once a company begins collecting data, transparency can be an important first step towards increasing diversity (Ann, 2015; Gilpin, 2014). eBay and Google, for example, release their diversity data both internally and publicly, stating that "transparency demonstrates commitment and conviction," (Angier & Axelrod, 2014). eBay releases demographic data about their employees as well as quantitative comparisons about the rates of male and female hires, promotions, and attrition. Companies may want to keep in mind that although quantitative data is very useful as a baseline, this data should be presented within context so that progress can be better assessed (Bebbington, 2002). Consistent with this idea, Catherine Bracy, the Director of Community Organizing of Code for America, points out limitations of quantitative data without context (Bracy, 2013). Bracy specifically mentions that although CB Insights Data reveals a 3 percent funding rate for all-female startup teams in Silicon Valley, the picture is much different in other geographic locations, namely Massachusetts (with a 31 percent funding rate). Bracy questions whether it is an anomaly in the data, an impactful situation unfolding prior to data collection, or a systematic force that creates such a difference for all-female startup team funding in different locations. Bracy highlights that the current data suggests no explanation for this occurrence, and calls for better data collection and analyses to answer important contextual questions.

Critical to any system for increasing diversity is the determination of accountable parties. Ann Lehman, a gender consultant, principal, and policy advocate who stressed the importance of holding management accountable for company diversity. Lehman suggests that companies can quickly increase gender diversity by including diversity progress as a factor in management-level performance appraisals. She also gives the example of supervisors being recognized and awarded for providing professional development opportunities to female staff. Intel, for example, attempts to hold their executives accountable for diversity progress by tying in their diversity contributions to compensation. Other suggestions include creating a diversity team or committee that meets regularly and visibly (NCWIT, 2011).

Tracking diversity metrics, sharing progress responsibly, and holding individuals or groups accountable are all important considerations when attempting to increase corporate gender diversity. Companies should keep in mind that there is no perfect practice for all; each organization must find the strategies that work best for them in accomplishing their unique goals.

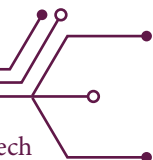# Strategies to Advance Diversity in Small Firms and Entrepreneurship

This report will now delve more deeply into the various sectors that comprise the tech industry, as well as the roles each plays in fostering diversity. Each has unique opportunities, challenges, and contributions to offer in fostering greater diversity in the tech sector.

Strategies advancing women in the startup and entrepreneurial community can take place in three major areas:

i.   Connections between entrepreneurs (networking and mentorship strategies);

ii. Connections between entrepreneurs and key support organizations/initiatives (incubators, accelerators, funding programs, etc.);

iii. Connections between support organizations/initiatives (collaborative events, sharing of best practices, sharing of board members, leveraging financial resources, etc.).

With respect to facilitating the advancement of women in these areas, four groups of key players exist. These include **startup firms** (i.e. directors, founders, employees), **resource providers** (i.e. incubators, co-working spaces, accelerators, mentorship providers), the **public sector** (i.e. government, universities and colleges), and **investors** (i.e. venture capitalists, angel investors, government grants, any other funders). Table 1 summarizes the proposed specific, scalable, and actionable strategies by groups of key players.

Startup Firms	Resource Providers	Public Sector	Investors
Seek Additional Female Referrals When Looking to Fill a Position;	Offer Targeted and Formal Mentorship Programs to Women;	Require Quotas from Small Businesses;	Provide Funding Specifically for Women;
Actively Include Women in Informal Networking Opportunities and Grow Access to Diverse Groups of Technology Innovators;	Provide Female-Only or Female-Centric Work Spaces;	Improve Business Reporting Requirements;	Modify Application Procedure to Allow Gender-Blind Submissions;
Send Female Representatives To Recruiting and Networking Events to Encourage Female Engagement with the Firm;	Develop an Information 'Hub' to Foster Transparency & Data Collection.	Provide Targeted Educational Opportunities;	Advance Women as Investors;
Reach out and hire those that support the advancement of women in tech and are not biased against them;		Mandate comprehensive maternity leave policies.	Pursue Impact Investment Models;
Proactively identify and address incidents of biased behavior when they occur;			Demand Quota on Startups' Board of Directors
Provide Telecommuting Options to Support Parental leave;			
Seek Female mentors.			

Strategies for Startup and Small Companies

Proactively Recruit Women & Address Biased Behavior. Startup founders can intentionally seek to build a company culture that fosters an inclusive environment for women. As previously mentioned, the anecdotal experience of Enplug founder, Tina Denuit-Wojcik, was utilized to demonstrate the effectiveness of this method. Subsequently, several actionable steps were advised for startup founders:

- Seek additional female referrals when looking to fill a position;

- Actively include women in informal networking opportunities and grow access to diverse groups of technology innovators;

- Send women representatives to recruiting and networking events to encourage female engagement with the firm;

- Reach out and hire those that support the advancement of women in tech and are not biased against them;

- Proactively identify and address incidents of biased behavior when they occur;

- Provide telecommuting options to support parental leave.

These strategies are likely effective but require additional case studies and further investigation into their enduring effectiveness.

Seek Female Mentors. Panelists recommended that startups intentionally seek out female mentorship in order to promote the involvement of women in the community and ensure the development of a company that is female-friendly. Mentorship has a significant impact on the long-term success of startups (Morris, 2015). Some argue that instead of focusing on female mentorship, however, the focus should be on engaging men in mentoring women (Ouimet, 2012). Despite the dearth of formal studies on the role of female mentorship in advancing women in tech, research has addressed some stigmas that startups may have in seeking female mentors. Contrary to some reports (Allen & Eby, 2004; Ensher & Murphy, 1997), several studies have found no difference in the amount of psychosocial support provided by female versus male mentors (Ensher & Murphy, 1997; Ragin & Mcfarlin, 1990). Additionally, few differences have been found in same-gender versus cross-gender mentorships (Ragin & Mcfarlin, 1990). Even though cross-gender mentors are less likely to engage in after-work social activities, they do not differ in how much they are perceived as 'friends' by the mentees. This suggests that cross-gender mentorships focus their relationship to the formal work setting. It is unknown whether this produces a positive or negative effect for the mentees overall.

Several studies provide evidence that perceived similarity as opposed to actual similarity between mentor and mentee (i.e. by race or gender) most influences the quality of mentorship relationships (Ensher & Murphy, 1997; Allen & Eby, 2003). For example, research by Cheryan et al. examined the impact of role models on women's beliefs about what success looks like in the STEM domain by presenting women with non-stereotypical and stereotypical role models in computer science (2011). The stereotypical role models conformed to the computer science stereo-

type through manipulations in clothing and interests. This research found that the female participants perceived themselves to more similar to the non-stereotypical role model, regardless of the mentor's gender, and thus reported higher levels of success beliefs. Therefore, this research suggests that women's success beliefs about their potential in technology industry may be increased by interacting with role models whom they perceive as similar, but not necessarily with role models of the same gender. Furthermore, even though men's contact with their mentees in the future varies based on whether they are of the same race or not, the effect does not hold for female mentors (Ensher & Murphy, 1997). Perhaps most pertinent to our conversations, there is evidence that men who are mentored by women are more aware of gender bias (Prime & Moss-Racusin, 2009). Taken together, these studies should encourage startups to seek out female mentors that are characteristically alike to them. However, further investigations are needed to gauge the effectiveness of this approach as a strategy to advance women in tech.

Strategies for Resource Providers

Offer Targeted and Formal Mentorship Programs to Women. Advocates argue for the mentorships crossing gender lines. Male mentors of female mentees cross the gendered boundaries of skill attainment and network development that is essential to career advancement (Ouimet, 2012). Mentorship of women by other women provides advice for navigation of women-specific matters; ("More Women," 2012; Slane, 2014), and mentorship of men by women to develop male allies and change agents (Prime & Moss-Racusin, 2009). Studies are needed to evaluate the comparative effectiveness of these approaches. Nevertheless, research shows that many women identify an entrepreneurial ally as a motivating factor for becoming entrepreneurs themselves (Cohoon, Wadhwa, & Mitchell, 2010) and indicate the unavailability of mentors as their top challenge (Robb, Coleman, & Stangler, 2014).

Provide Female-Only Work Spaces. Though controversial, some anecdotal evidence (such as Geekettes' all-women hackathon) show promise of fostering continued interest in tech and providing an opportunity to work or experiment without interruption. Such spaces could provide tailored mentorship and support to women in tech and reduce environmental barriers (including overt and unconscious biases and sexual harassment) to their advancement.

However, several aspects of this strategy must be further evaluated: First, similar to the disadvantages of having male-only startups, female-only spaces possibly limit their access to other perspectives and innovative solutions. An analysis of the costs and benefits of having female-only spaces can help determine whether this is a valuable tradeoff. It is possible that such an approach does not cause isolation when conducted in short-term settings (e.g. day-long all-women hackathons). In addition, researchers suggest that it may be beneficial for women to be the majority in situations such as all-women leadership programs, especially if the exclusively female programs are experienced in combination with mixed-gender programs (Ely, Ibarra, & Kolb, 2011). Second, concerns arise about the implication of homogeneity among women: Are the needs of women entrepreneurs as a group similar enough to group them together? Panelists warned that such spaces must avoid stereotypes of femininity and be wary of the possibility of alienating women who do not fit these expectations. Third, such strategies may not be effective in addressing the systemic challenges women face in the larger tech community. Little research has examined these organizational models (Women-only, 2011). Additional analysis is imperative to examining the effectiveness of this strategy.

Develop Information 'Hub' to Foster Transparency & Data Collection. Some propose the development of a central hub that would make public information about the level of female-friendliness of startups, resource providers, and investors. This would provide insight into the extent of the problem, its possible solutions, and correlates of female-friendliness. Protocols and best practices would have to be developed based on prior research to standardize reporting practices and evaluative metrics of female-friendliness (e.g. number of women employed, parental leave). This strategy is quite promising since it would provide the field with an initial database to facilitate future research. A startup support service provider could act as a policy champion and develop such a hub. Another viable option is for funders to produce a list of startups in which they have invested and mandate each startup report their inclusion of women. This would inform the startup of their ranking among their peers and act as a motivator to outreach to more women (Whitney & Ames, 2014).

Strategies for the Public Sector

Some of the ways in which resource providers—especially those who receive federal or state grants or funding—can contribute to diversity in the tech sector also apply to the public sector. Due to the breadth and scope of the public sector, however, there are unique ways they can advance women and minorities in the tech workforce.

Currently, public sector initiatives and laws remain fragmented by jurisdiction, and often lack successful enforcement or implementation. Though certain states, including California, Washington, Massachusetts, New Jersey and Rhode Island, have implemented policies aimed at retaining, advancing, and fairly compensating women in the workforce, federal policies do not adequately address gender disparity in the workforce. There is also limited research on the impacts these policies have had on women in the workforce, making it more difficult to justify or redesign and emulating them nationwide.

Fostering entrepreneurship. The number of new entrepreneurs in America rose from .28 percent in 2013 to .31 percent in 2014 (Fairlie, Morelix, Reedy, & Joshua, 2015), underscoring the need for innovative partnerships between the government and the private tech industry. This could include the implementation of public policies, the protection of individual rights, government support of small businesses, and inclusion of historically underrepresented groups in the tech sector. An existing example is the Bixel Exchange, a partnership between the Los Angeles Chamber of Commerce and the Small Business Administration, offering mentorship, workforce development, and educational programming to increase participation in technology fields. Bixel Exchange also matches tech entrepreneurs with business advisors and mentors specializing in advancing women in tech, among other start-up-related matters. Federally, the U.S. Department of State's TechWomen initiative brings female leaders in Science, Technology, Engineering and Mathematics from Africa and the Middle East to Silicon Beach for mentorship, networking, and professional development. Furthermore, the White House launched the entrepreneurship and innovation initiative, Startup America, in 2011 (Office of the Press Secretary). Startup America aims to promote and facilitate the growth of entrepreneurship through the implementation of entrepreneur-focused policy initiatives; these initiatives benefit the advancement of innovative fields such as information technology. Although Startup America does not specifically target women in the technology industry, the Startup America Partnership—a partner of the federal initiative—does have a "Startup American Women" initiative that caters to women-led startups (Office of the Press Secretary, 2011).

Public-private partnerships. The Bixel Exchange, a partnership between the Los Angeles Chamber of Commerce and the Small Business Administration, offers mentorship, workforce development, and educational programming to increase participation in technology fields. The Bixel Exchange also matches tech entrepreneurs with business advisors and mentors specializing in advancing women in tech entrepreneurship. Federally, the U.S. Department of State's TechWomen initiative brings female leaders in Science, Technology, Engineering and Mathematics from Africa and the Middle East to Silicon Beach for mentorship, networking, and professional development. Furthermore, the White House launched the entrepreneurship and innovation initiative, Startup America, in 2011 (Office of the Press Secretary, 2011). Startup America aims to promote and facilitate the growth of entrepreneurship through the implementation of entrepreneur-focused policy initiatives; these initiatives benefit the advancement of innovative fields such as information technology. Although Startup America does not specifically target women in the technology industry, the Startup America Partnership—a partner of the federal initiative—does have a "Startup American Women" initiative that caters to women-led startups (Office of the Press Secretary, 2011).

The United States Department of Labor and Equal Pay Task Force (which was launched by President Obama in 2010), hope to encourage the use of technology to close the pay gap between men and women. The "Equal Pay App Challenge" called for software developers to "create applications that provide greater access to pay data, deploy interactive tools for early career coaching and online mentoring," and disseminate data and resources to inform salary negotiations. The pay gap between men and women diminishes when women discuss compensation with their male counterparts, highlighting the need to set clear negotiation goals for women discussing salary with their employers.

Require Quotas from Small Businesses (Demonstrated Effective). Quotas on the number of women and minorities that must be employed in various positions and board seats is one of the most controversial subjects in the discussion of workplace diversity. Some Americans are concerned about the costs quotas would impose onto small businesses, the long-term effectiveness of the strategy, and potentially the negative assumptions it may produce towards the credibility of women who are hired by these firms (Dixon, Gates, Kapur, Seabury, & Talley, 2006; Smith, 2014). However, many cite research indicating that diversity is economically beneficial for companies and the global economy (Rice, 2014; Sklar, 2014; Isaac, Lee, & Carnes, 2009). Consistent with this school of thought are Aaron Dhir's findings from his research regarding the impact of Norway's legislative decision to enforce gender quotas for publicly traded firms (Dhir, 2015). Dhir conducted telephone interviews with corporate directors and qualitatively assessed the experience of the directors both pre and post the enforcement of the law. He notes negative repercussions in the short run and recognizes the potential difficulties of implementing quota systems in the United States. Dhir nevertheless discusses that modified actions could be taken by the United States government to achieve similar benefits, such as instituting a gradual approach to the quota system that involves incremental quotas. Due to social and political differences between the United States and Norway, it is not clear to what extent Dhir's results can be generalized across nations.

However, his research does suggest that quota systems may have long-term benefits that offset the associated short-term costs. The Kauffman-RAND Center for the Study of Small Business and Regulation produced a working paper in 2006 describing the literature in the field (Dixon et al., 2006). They concluded that further research and cost-benefit analyses are needed to determine the effects of such regulations on small businesses. Additional regulations do impose a high cost on small businesses, possibly limiting the activity of citizens and the nation's economic growth. The size of the business to which such rules should apply must be thoroughly examined prior to imposing requirements. Experts may also select to study the effectiveness of using metrics other than size (e.g. revenue, development stage) that could be used to determine the imposition of varying levels of regulations. However, judged solely on its ability to increase female participation, quotas seem to have demonstrated effectiveness in the literature. There is also overwhelming public support for quota systems in nations that implement them, including in Germany and Norway.

Improve Business Reporting Requirements. It is possible that updating Equal Employment Opportunity Commission's (EEOC) reporting requirements would aid diversity initiatives, particularly for small firms. Currently, EEOC requires businesses with 100 or more employees to submit EEO-1 reports on their race and gender makeup (EEO-1 Instruction, 2006). The Commission may select to extend its requirement to smaller size businesses and make the information public as a means of increasing transparency and driving change. A more scalable strategy might be for local governments to impose such requirements in their municipalities to signal the prioritization of this issue. Encouraging reporting practices also informs the company of where they stand in comparison to others. This information could serve as a motivation for improvement (Whitney & Ames, 2015). Additionally, pursuing

strategies to enhance enforcement may be effective. The role of the public sector in advancing women in small businesses and startups may be to provide the right type of incentives to the firms, whether it is to avoid a fine, to acquire grants, or to improve public perceptions of the firm.

However, policymakers should note the limitations of quantitative data. In a review of issues in science, engineering, and technology, Diane Bebbington stresses the importance of quantitative data being released with a careful attention to context (2002). Bebbington warns that quantitative data can misrepresent the state of women's advancement and should not be used to inform policy if data is presented independent from broader issues.

Anonymizing Job Applications. Several European countries—including Germany, The Netherlands, Sweden, France and (most recently) Great Britain have either compulsory or incentivized provisions for anonymizing applicants' information. In 2010 Germany's Anti-Discrimination Agency, an advisory body, sponsored a voluntary scheme to get businesses to try it. In France, a law passed in 2006 made the anonymizing of applicants' résumés and CVs compulsory for firms with more than 50 full-time employees.

Expanding Access to Startup Capital. Federal and state governments can provide seed grant money to fund female and minority entrepreneurs. This recognizes that traditional funding models are often fraught with subconscious biases that make it more difficult for women to fund their ideas. Due to their expansive networks of partners across sectors, the public sector is optimally positioned to allocate resources to ventures that may have difficulty securing funding in traditional pipeline models, but offer innovative and viable concepts that would benefit the national and global economy.

More research into the effects of government-issued capital is needed to demonstrate whether such grants have a strong return on investment back into the economy.

Maternity Leave. The United States is the only industrialized nation without mandated paid maternity leave for mothers of newborns. Individual organizations (and state legislative and executive agencies) are free to implement their own family and parental leave policies. Though an expansion of federal maternity leave policy, under the Family and Medical Leave Act, does not seem likely in the near future, states such as California, New Jersey and Rhode Island are considering provisions for longer paid and unpaid maternity leave.

Lack of consistent and reliable maternity leave impacts career opportunities and earnings for women, many of whom report returning to less hospitable work environments, penalizations in performance reviews, and marginalized career trajectories after returning from (typically brief and unpaid) maternity leave (Cheiffetz, 2015).

States and nations with more generous parental leave policies do not experience the mass exodus that characterizes the heightened gender disparity past the middle management level. The tech sector is particularly vulnerable to this trend, as most women who leave the sector do so at the middle of the careers, often when they have reached middle management positions but plateau in their career trajectory and have little opportunity for growth in their careers. They almost never return to the tech sector after this critical point, and many leave the full-time workforce permanently (Gardner, 2015).

The discrepancy that the impact parenthood has on American men and women is also telling of the need to enact public systems to protect working mothers from overt or subconscious discrimination, as it is clear that the steps

companies individually take do not treat parenting employees equally. The University of Massachusetts found that each child a woman has, on average, lowers her salary by 4 percent, while men average more than a 6 percent salary increase for each child (Budig, 2014).

Need for more resources and research. Public sector strategies remain largely fragmented and inconsistently implemented across the United States. An expansion of these programs and a longitudinal study into their social and economic impacts—as well as most successful design and implementation of such initiatives—is needed.

Strategies for Academia and the Education Pipeline

Women and girls not only drop off the STEM education pipeline at every stage, but have factors dissuading them from pursing math or science beginning in infancy. For example, parents are three times more likely to explain science exhibits in museums to their sons than they are to their daughters (Crowley et al., 2001).

At the middle and high school level, companies can partner with non-profits to provide mentorship opportunities for young women to inspire them to pursue technical careers. For example, Cisco is a founding member of the mentorship platform US2020e that links girls and minorities with a professional mentor in a STEM field (Fairchild, 2015). In conjunction, by funding programs that increase K-12 access and exposure to computer science, companies can inspire more students to pursue computer science. For example, Google recently launched CS First, a program designed to help facilitate students' exposure to computer science education in after-school, in-school, and summer programs. Through programs like CS First, Google provides instructional videos, lesson plans, and other training material for teachers and other community volunteers to start their own clubs.

Recruiting Women into Tech Jobs. At the college level, companies can encourage and retain women in technical majors by maintaining a strong presence on college campuses. Companies can have their female employees give technical talks on campus and serve on advisory boards, or by funding targeted research projects to increase female exposure to computer science research. Intel's Science and Technology Centers and the Microsoft's Research Collaborative Institutes have invested time and resources into major research universities and institutions that foster vital research collaborations between their corporations and academic. These practices not only solidify relationships with "emerging technical talent," they can also be "a cornerstone strategy for companies who wish to recruit diverse talent" (Simard & Gammal, 2012).

Higher Education and Career Readiness. There is considerable, and widening, disparity between the number of men and women who study computer science in college, with the proportion of women holding computer science degrees dropping from 23 percent to 18 percent in the last 10 years (National Student Clearinghouse Research Center, 2015). Of those who do graduate with a computer science degree, 40 percent are not working in the field five years after graduating (Guglielmo, 2015).

Due to low percentage of women in technology-related college majors, it is likely that students who later became innovators in such fields did not receive many collaborative opportunities with females during their education and therefore, did not seek out women when initiating a startup company ("By the," 2015). This may happen because the innovators expect to be working with mostly males, as they did in college, or because they hire from their college network, which is predominantly male. It is also important to provide women and girls with opportunities that develop skills that are traditionally encouraged in men and traditionally de-emphasized for women. For example, research demonstrates that women are less likely than men to negotiate for what they want and promote their own interests (Babcock, Laschever, Gelfand, & Small, 2003). Thus, it may be wise to place a greater emphasis on preparing women for situations they are likely to face in the workforce, including pitching ideas in front of an all-male investor board, negotiating for desired projects and salaries, and participating in equity financing.

Scholarships. The importance of scholarships and mentorship supporting women in these fields is well-known and well-documented. Organizations within the public, private, and nonprofit sectors can each fund scholarships and internship programs for technical positions (Simard & Gammal, 2012). As well as support and partner with

conferences that promote undergraduate diversity in tech, such as the Grace Hopper Celebration of Women in Computing and the Conference of the Society of Women Engineers (Angier & Axelrod, 2014; "Bit by," 2003; Gammal & Simard, 2013; Simard, 2010; Van Huysse, 2014).[2] Intel is an example of a company that is interested in funding women and underrepresented minorities in engineering and computer science; Intel is reportedly hoping to offer scholarships to underrepresented technology scientists of up to $2,000 (Vara, 2015).

STEM Professors. A 2012 study by Yale University found that biology, chemistry, and physics professors consider female undergraduates less competent than male students with comparable grades and accomplishments—and are less willing to mentor women or offer them research jobs (Guglielmo, 2015).

The dearth of tenured female professors in STEM is likely both causal and reflective of discrimination against women in the sector. Because women are more likely to pursue fields that are people-oriented and focus on social good, universities and training institutes could offer courses that focus on entrepreneurial and technological approaches to advancing social welfare (Chamberlin, 2003). It is possible that by incorporating social issues and relational values into the technological fields of study, more women would be attracted to such degrees. Researchers Dimond and Guzdial (2008) suggest that involving students in service learning projects related to computing has the potential to increase female students in computer science. They stress the need to change the culture of computer science so that more women pursue computing. However, the researchers emphasize that students should be exposed to how computing provides clear pathways to helping others early on in their curriculum, especially in introductory courses. This practice of providing social context to computing degrees may prove successful because research shows that women tend to elect degrees that are more people-oriented and have a positive societal value (Eccles, 2008; Miller, Rosser, Benigno, & Zieseniss, 2000; Cuny & Aspray, 2000; Ellis, Morelli, de Lanerolle, Damon & Raye, 2007; Dimond & Guzdial, 2008; Chamberlin, 2003). On the other hand, some experts attribute the roots of the gender inequity problem to the elementary and secondary educational system and recommend focusing efforts in that area (Verbick, 2002).

Provide Targeted Educational Opportunities. Social Entrepreneurship degrees (which are more likely to appeal to women because of they way they have been socialized since early childhood) are traditionally housed in the business schools rather than engineering or computer science departments. Very few examples exist of such courses in tech-related programs.[3] In 2014, Wesleyan University offered an online course on Coursera.org that considered ways in which "innovative thinking and technology can address pressing global challenges" (Roth). The course originated from the Social Good Summit, a conference examining "the impact of technology and new media on social good initiatives around the world" ("Social Good," 2015). The Coursera.org course received 47,981 enrollments with a 3.86 percent completion rate. Although the completion rate appears small, the course still exposed many individuals to the material and demonstrated impact with 1,851 students completing the course. Also, it is important to note that this completion rate is consistent with a Penn Graduate School of Education study finding that MOOCs (free, widely accessible online classes) typically foster a completion rate around 4 percent (Stein, 2013).[4]

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2 See appendix for list of conferences

3 Notable examples include "Analytics for Social Good" offered at Northwestern University in 2015 (http://www.mccormick. northwestern.edu/industrial/news/articles/2015/new-course-offering.html) as well as "Tech for Social Good: Data Science" taught in Fall of 2015 at Earlham College (http://www.earlham.edu/faculty-resources/fall-2015-earlham-seminar-course-description/).

4 For example, refer to student profile data provided by University of Southern California: https://www.marshall.usc.edu/msse/studentprofile

RECOMMENDATIONS FOR RESEARCH

The UCLA Luskin Center for Innovation recognizes that the strategies outlined in this report are only as strong as the research that supports them. There are significant gaps in existing knowledge, especially concerning effective public sector strategies. The following research recommendations highlight those gaps, and provide recommendations for future research. It is our hope that this outline will inform the next steps for researchers and companies looking to promote gender equity and improve industry-wide diversity.

1. **Expansion of Local, State and Federal Policies.** More research is needed on ways the public sector at the local, state, and federal levels can foster and incentivize diversity. Although this report highlights numerous examples of government programs and initiatives, these strategies remain largely fragmented and inconsistently implemented across the United States. An expansion of these programs and a longitudinal study into the social and economic impacts they have—as well as most successful design of such initiatives—is needed.

2. **Company-Release Results of Internally Tested Strategies.** The most apparent gap in the existing literature is regarding methodically tested corporate strategies for advancing women in technology. Therefore, companies that experiment with diversity strategies within their own organizations should consider releasing the results to the public, including strategies that do not produce significant, positive effects. This would help researchers determine which strategies should be tested with scientific rigor, while also helping other companies decide which strategies might be worth adopting.

3. **Research Acknowledging Women of Color's Unique Experiences in Technology.** Women in science have been shown to experience biases differently as a function of race (Williams, Philips, & Hall, 2014). Future research should therefore emphasize gender diversity strategies in light of these differences, making an effort to test best practices for women overall and by race (Harris, 2008). Research suggests that because the pathway to leadership within a company may be different for women of color, research on female minority executives could reveal tailored success strategies to inform the advancement of minority women in male-dominated industries.

4. **Test Strategies to Offset Technology's Male-dominated Reputation.** Technology's reputation for being a male-dominated industry is considered a primary deterrent for prospective women in technology (Google, 2014). Future research may want to examine how the technology industry can change this perception on a large scale. For example, previous research has shown that positive perceptions of past experiences, role models, and social support can offset social identity threat for women in male-dominated fields (Richman, vanDellen, & Wood, 2011). Therefore, future research may be interested in testing strategies to induce or strengthen these buffers with respect to women in the technology domain. In particular, more research is needed to assess the effect of partnerships between technology and the media. Specifically, research should focus on how these partnerships influences youth's perception of women in STEM, as well as how these partnerships affect young women's interest in pursuing a STEM-oriented education or career. Finally, previous research has suggested that stereotypic computer science role models may be harmful in regards to attracting women to computer science (Cheryan, Siy, Vichayapai, Drury, & Kim, 2011). Cheryan et al. recommend future researchers test the impact of "STEM-counterstereotypic" role models on women's success beliefs.

5. **Release Data that Reveals More than Headcounts.** Future research should move beyond focusing on how many women are participating in the technology industry and focus more on how women are participating and contributing (Ashcraft & Blithe, 2010). In so doing, more granular and nuanced insights about the opportunities afforded to women should emerge. These insights will continue to inform and promote efforts to augment diversity in the tech sector.

6. **Test Strategies to Connect Women with Sponsors.** Extant literature reveals that sponsorship relationships are important to women in technology, as traditional formal and informal mentorship tends not to cross gender lines (Anderson, Gilmour, & Castro, 2013). However, women in science, engineering, and technology often face greater difficulties in securing a sponsoring relationship (Hewlett, 2014). The importance of sponsorship for career advancement and executive leadership tracks is well-documented, indicating the cyclical influence of institutional opportunities. Future research should examine the specific strategies that are most effective in helping to connect women with potential sponsors.

7. **Meta-analyses of Enforced Gender Quotas.** Qualitative and quantitative research has shown that gender quotas have yielded positive effects in Norway (Dhir, 2015) and Germany, though the concept remains controversial in the United States. Future research should consider conducting meta-analyses of various corporate outcome metrics across companies in Norway, and across other countries with enforced gender quotas. Perhaps researchers might consider conducting analyses that compare these outcome metrics at different points in time, assessing the short versus long-term effect of quotas. This would lead to a better understanding of the impact of gender quotas in participating nations, and can lead to more informed discussions about what the US can learn from the successes and challenges of these participating nations.

8. **Expansion of Government Loan, Scholarship, and Grant Programs.** The disparity in the education and startup-funding pipelines are especially stark. The Luskin Center for Innovation suggests more expansive involvement by the public sector to compensate for the well-documented shortcomings in traditional education and funding models that tend to disenfranchise women and women of color pursuing tech fields.

9. **Study Company Presence on College Campuses.** Research should examine the impact of companies, such as Intel and Microsoft, which maintain strong recruiting presences on particular college campuses (Simard & Gammal, 2012). It would be meaningful to learn how frequently women are able to interact with company professionals for various purposes and how this presence influences women's educational and career interests.

10. **Evaluation of After-School Computer Science Classes/Mentoring Programs.** While research has shown that any type of positive exposure to computer science during the K-12 years is valuable (Google, 2014), future research can benefit from further evaluation of such initiatives. Emerging data can bolster the strategies and best practices that are most effective.

11. **Study Impact of Combined Technology and Social Welfare Degrees.** The disconnect between many technology degree-granting programs from "social good" components may be deterring women from pursuing technology degrees. Future research should study the impact of those technology degrees that do emphasize social good, perhaps comparing the retention and advancement of women with these degrees to women with strictly technical degrees.

Conference Summary

The sections below summarize key themes discussed at the April 2015 conference. Themes were divided into two tracks: Small Business and Entrepreneurial Sector, and Medium and Large Organizations. There are many tactics and strategies most applicable to either the startup ecosystem or medium and large companies, but we also highlight overarching strategies.

Fostering Women Entrepreneurs and Leaders in Startups and Small Firms and Organizations

This track at the conference explored ways to foster female entrepreneurs and leaders in startups, small firms, and organizations. The first panel examined strategies for leveraging startup resources, including those from incubators and accelerators. The second panel discussed ways to expand access to resources within the startup funding pipeline (including seed money from angel investors and venture capital funds), as well as the role investors and nontraditional funding sources play in advancing women in technological fields.

As the startup community continues to grow, so do concerns about the low levels of female involvement in entrepreneurial ventures (Tinkler, Whittington, Ku, & Davies, 2015). As panel experts discussed, the lack of diversity in startups self-perpetuates because those who begin them commonly seek out others who are similar to themselves. This tendency has been shown to reduce startups' profitability and innovation, while also significantly reducing opportunities for women. One factor that contributes to the dearth of women in entrepreneurial ventures is the education pipeline.

Educational disparities between men and women in technology-related majors results in proportionally fewer women earning the necessary degrees to be qualified for technology career positions. This leads to a relatively small pool of female talent. Another contributing factor to the low levels of women in entrepreneurial ventures is that investors have a bias towards funding entrepreneurial endeavors led by men (Brooks, Huang, Kearney, & Murray, 2014). This problem is exacerbated by the fact that women constitute a small percentage of venture capitalists and investors (Gompers, Mukharlyamov, Weisburst, & Xuan, 2014). Women face an additional difficulty in startups because these companies are exempt from many federal employment laws (e.g. parental leaves, quotas) by virtue of their small number of full-time employees. As long as these underlying obstacles such as inequitable access to funding resources, unconscious biases about women's abilities to manage tech firms, and workplace cultural problems persist, simply placing the onus of change on women or increasing their interest in tech fields is not likely to significantly reduce gender disparity. Linda Moore, President and Chief Executive Officer of TechNet, a D.C.-based firm, emphasized, "while the tech industry is always thought to be a problem solver and all about the future, the one thing it's not leading on […] is the fact that it does not include enough women or people of color. It's a liability. It's something we have to tackle."

Key Themes

Speakers in this track discussed strategies for disbanding or alleviating the effects of such systemic hindrances to women's advancement. Several themes emerged from these conversations:

1. **Early Buy-in.** Since startups, by definition, begin building their company from the ground, they have the advantage of intentionally building a culture that focuses on diversity and inclusivity. They have the capacity to disrupt implicit and explicit discriminatory behavior and actively seek out female talent. Using her own startup company as an example, Tina Denuit-Wojcik, Chief Technology Officer of Enplug, emphasized this approach by saying, "We just wanted to have a company that is great to work [at] for everybody. The culture was always the number one thing for the founders." She continued by reminding other innovators that "it's important to start with this in mind: That we want to hire people who are not biased and if people are biased, we try to make them realize their bias and cure them of [it]." As Kevin Lew, Director of the Bixel Exchange with the Los Angeles Area Chamber of Commerce, pointed out, one challenge is that such efforts can be time- and resource- intensive. For example, it may be both time consuming to expand recruiting pools so that women are better represented, and e resource intensive to host workshops or interventions to address gender biases.

> *"What can men do? Make it more comfortable for women to be at the table with them. It's not a boy's club. It's just a table."*
>
> -Erin Flynn, Principal at Ackrell Capital, LLC

2. **Proactive Investment in Female-Led Startups.** Panelists encouraged shareholders and investors (including venture capitalists (VC) and angel investors) to actively advocate for gender equity through their investment choices. Socially responsible investment models were discussed such as positive investing, impact investing, syndicates, and crowdfunding. Leigh Honeywell, computer scientist and activist, demonstrated the potentially high impact that investors can have: "VC's and angels can be demanding a literal quota for women on [the startups'] boards of directors. Even if that quota was 1, it would raise the bar for most startups." A highlighted example is 500 Women, an initiative led by the seed fund and startup accelerator '500 Startups' to proactively invest in female-led businesses. Another unique example is Google's #40Forward, a program that provides resources and financial support to women entrepreneurs in the startup community. Melinda Moore, the Chief Marketing Officer of crowdfunder.com, pointed out the potential for nontraditional funding sources to democratize access to capital by allowing all individuals, regardless of race, gender, etc., to powerfully communicate their stories to a group of accredited investors. This could lead to an increase in financial support for female-led startups while also providing women with a non-traditional pathway to becoming involved in investing.

> *"VC and Angels can be demanding a literal quota for women on [startups'] boards of directors. Even if that quota was ONE, that would raise the bar for startups."*
>
> -Leigh Honeywell, Software Engineer

3. **Female-Focused Events.** Conference panelists believed that female-focused technology events can foster a female-friendly industry and encourage female entrepreneurs. One example of a female-focused event is the all-women hackathon led by Geekettes that took place in Berlin, Germany and drew over 200 applications. Jess Erickson, Founder of Geekettes and Director of Marketing at 500 Startups, claimed that projects developed by the participants of this hackathon were especially likely to be innovative solutions to societal concerns because this group personally understood the challenges women in tech face. Importantly, discussions that arose among conference attendees as a result of these suggestions emphasized the need for recognizing heterogeneity among women when planning such events to ensure that they do not only cater to stereotypes of traditional femininity.

4. **Education and Mentorship.** Extensively discussed was the provision of goal-oriented and targeted education at the collegiate and K-12 levels. As Louis Stewart, Deputy Director of Innovation and Entrepreneurship in the California Governor's Office of Business and Economic Development (GO-Biz), pointed out, this involves exposing women and girls to such opportunities early on in their education and career. Tailoring STEM fields at the elementary, secondary, and higher education levels are important steps to further the pipeline of eligible and interested women pursing tech careers.

5. **Public-Private Partnerships.** At the conference, Louis Stewart further urged entrepreneurs to actively connect with government officials to discuss potential partnerships. He highlighted the Social Venture Exchange (SVX) efforts, which under the impact investment model, evaluates possible investments from the public perspective with the goal of creating positive social and environmental impact while generating a financial return. SVX was initiated in Canada and discussions are currently underway for developing a similar model in California as well.

"You have to make it socially incorrect, politically incorrect, to do the kinds of things that are happening right now. Unconscious bias or conscious, they keep women and minorities from moving ahead in tech."

-Linda Moore, President & CEO of TechNet

Attracting and Retaining Women in Medium and Large Companies and Organizations

Track 2 of the "Rethinking Strategies to Advance Women in Technology Conference" focused on strategies that promote gender equality in the corporate workforce at medium to large companies. These solutions were explored during the course of two breakout sessions. The first session focused on ways to better attract female employees to tech jobs; the second focused on policies for retention and advancement of women in tech.

Speakers in each session included:

Session 2.1: Corporate & Public Policies to Attract Women in Tech Jobs	Session 2.2 Policies for Building Retention and Advancement of Women in Tech Careers
Katherine Oyama Senior Policy Council, Google, Inc. (Moderator)	Lisa Conn National Organizing Director, FWD.us (Moderator)
Madeline Heilman Professor and Author, New York University (NYU)	Michelle Angier Director of Women's Initiative Network, eBay, Inc.
Brooke Hunter Chief Operating Officer, Engine, Inc.	Tiffany Crawford Founder and Chief Executive Officer, CREATE Leadership Institute, Inc.
Victoria O'Seni Chief of Staff, Information Technology, Creative Artists Agency	Denise Gammal Senior Director, Diversity and Inclusion, Exponential Talent, LLC
Susan Palm Vice President, MetricStream, Inc.	Shelly Zalis Chief Executive Officer, Ipsos OTX

The issues surrounding the matter of gender equity in tech are multifaceted, and these myriad facets were explored during the participants' discussion of existing conditions, cultural considerations, and potential disparity-mitigating strategies.

Obstacles and Biases

One of the issues that impacts the number and status of women in tech companies early on in the process is the discouraging **male-oriented representation of companies and industry culture.**

This issue was discussed at length in Session 2.1., Corporate & Public Policies to Attract Women to Tech Jobs. Due to the way many tech companies have marketed themselves, women are often led to feel like they will not fit in well at individual companies or even the tech sector at large. Companies often publicly emphasize perks and elements of corporate culture that appeal more to traditionally masculine values in favor of those that appeal to more traditionally socialized feminine values.

For example, as both Brooke Hunter and Madeline Heilman discussed, it is overwhelmingly common for companies to discuss their "work-hard, play-hard" culture in their recruitment pitches, and to ignore the work-life balance policies that allow for family planning and caretaking (responsibilities that often fall to women).

This kind of company representation leads people who need or deeply care about those types of policies to self-select out of the potential labor pool for specific companies, or even out of the field in general. Though this disproportionately weeds out potential female candidates, Valerie Aurora of the Ada Initiative pointed out during the opening plenary that this mindset is also problematic for young men joining the tech sector; men certainly need work-life balance policies too, though they may not feel as comfortable admitting it.

"I don't care if there's a 24-hour keg. I want to know that I can go home at a reasonable time to still be able to see my family. I want to know that it's okay for me to think that having a family is important."

-Madeline Heilman

Failing to explain that the company supports work-life balance also discourages those who do not necessarily need those policies, but who do not feel like their values align with the companies. They opt out because they feel that they are not a "good fit," or that the company will perceive them that way. As Madeline Heilman said, nobody "[wants] to go into a field that they don't belong in."

The issue of male-oriented representation exerts itself in the way job descriptions are outlined as well.

When job descriptions are written in a gendered way, they are typically skewed towards men. Job descriptions that use masculine pronouns and traditionally masculine descriptions (e.g. "The ideal candidate will be an aggressive go-getter. He won't stop until the job is done,") subtly indicate to potential female applicants that this role is not intended for them.

In addition to these subtle but pervasive discouragements, women have to contend with a variety of biases when considering joining the tech sector, and again when they enter the field. These types of biases include:

Tightrope Bias. A topic that emerged during the plenary as well as throughout Track 2 was the impact of Joan Williams' often-cited "tightrope bias" (Williams, 2014).

Men and women are socialized and expected to behave in different ways. Despite these different social expecta-

tions, success in tech roles is often measured along metrics based on those attributes traditionally instilled in men and discouraged in women. Women who embody the socially expected feminine characteristics (such as being more collaborative and sharing credit for success) can be penalized professionally for not fulfilling the masculine-based standards for success.

Conversely, women who do behave according to the more masculine standards for success, by independently self-promoting their own contributions for example, are just as likely to be penalized. The same behavior carried out by men and women may be seen as appropriate in the former, but inappropriately "aggressive" in the latter.

Thus, women may have to walk the "tightrope" of choosing between adhering to professional versus personal gendered expectations.

> *"There's a real inconsistency between the attributes that we associate with women and the kind of requirements that we see as necessary to do the kinds of jobs that are kind of typically seen as "male." Women are seen as somehow falling short. They don't have 'the right stuff.' Yet, women will really self-censor and inhibit themselves because they know that if they promote themselves and come on strong and they are assertive and ;bossy,' they're going to get knocked down for that too."*
>
> -Madeline Heilman

Prove-It-Again Bias. Women have to provide substantially more evidence of competence, only to be perceived as equally competent as their male counterparts. This can take a toll personally and professionally on women in the tech sector who have to prove themselves repeatedly, without receiving any additional benefits for the additional work.

Confirmation Bias (and self-fulfilling perspectives). People tend look for ways to validate and confirm their preconceived expectations and perceptions. These perceptions are often biased due simply to socialization and the environment in which people operate. Such preconceptions include, for example, the expectation that men outperform women in technical roles. People see more men in technical roles and come to think it is because they are more competent; they hire more men for new technical roles, and the cycle repeats itself.

> *"Research that shows that if you present people who have worked jointly on a successful task, women are consistently given less credit for that outcome, with no reason whatsoever"[beyond the gender difference]."*
>
> -Madeline Heilman

Confirmation bias can manifest itself during the interview process, when a manager subconsciously fills in information they did not get or remember, with perceptions that align with his or her own preconceived notions and biases about that interviewee. It takes place in the workforce, when managers or colleagues subconsciously look for evidence that affirms their underlying belief that men are more technically competent than women.

Impostor Syndrome: Men are likely to apply for a job if they meet 6 of 10 listed criteria, but women tend to not feel qualified enough to apply unless they fit all listed qualifications They feel like "impostors," and that they do not deserve the position they have. This syndrome is an impediment to both attraction and retention efforts, as women dealing with this phenomenon often struggle to advance professionally.

The way job descriptions are written can also influence the pool of candidates who apply. Studies show that women are less likely than men to apply for jobs for which they possess some, but not all, of the listed criteria (Mohr, 2014). Women often cite a belief that all of the criteria outlined are prerequisites for applying, while men are more likely to view criteria as nice-to-haves. To help address this, companies can alter wording to indicate that not all criteria need to be met for an applicant to be considered.

These systemic biases often have a self-fulfilling nature. People in positions of power typically believe that their success is the result solely of their own merit, and not that they are the beneficiaries of inherent advantages. Identities become invested in that belief, and some become resistant to changes that might damage this belief. This happens to those who suffer from unfair disadvantages as well; the idea that their lack of success is caused solely by their own failures becomes ingrained and discouraged which results in their exiting the sector.

Another topic that emerged repeatedly was the matter of "intersectionality," or the recognition that social categorizations of identity (e.g. gender, race, sexuality) and their attendant advantages or disadvantages overlap and influence one another. For example, when people explain that the percentage of computing roles held by women in the U.S. in 2014 was only 26 percent, it should also be noted that women of color was only 9 percent ("By the," 2015). Women of color not only deal with the struggles faced by women, but also have to navigate the issues of race. As several conference speakers mentioned, the diversity gap in tech extends beyond gender—it impacts women and people of varying socioeconomic, racial, and other backgrounds.

Panelists discussed several best practices and strategies to combat the issues constraining the entry and success of women in corporate technical positions.

Best Practices Discussed

Individualize strategies to company specific-conditions. Companies differ by size, product, location, and role allocation---among a host of other factors. A company the size of eBay faces different problems than a young start-up does, and strategies that might work in one place might not work at another. Gender equality is a complicated issue and if a tech firm wants to have any hope of successfully addressing the issue, they must recognize their own conditions and tailor their strategies to meet those challenges.

Proactively identify baseline metrics. To individualize strategies, companies need to know what they need to address. To ensure their success, companies need to track and benchmark their progress along the metrics they have identified as important.

Early Adoption: Strong gender equality polices are most successful when implemented as early in the company's life as possible. It is easier to build a supportive system than to reform one in which discrimination is entrenched.

Emphasize executive support. Cultural changes are more effective when executives are decisive and expressive about their support. Employees will take cues about how they are expected and allowed to act from their managers. If a CEO supports diversity initiatives and makes it clear that discrimination will not be tolerated, employees are more likely to adhere to diversity initiatives.

Avoid ambiguity in human resource processes and use deliberately designed default systems. Where standards are not clear and explicitly documented, biases innately influence the way the way people are hire, evaluated, promoted, and treated. Training and education may help those who genuinely do not recognize the impacts of their biases, but deliberately designing processes to circumvent the expression of discriminatory biases is more effective in removing the impacts of systemic biases. By being specific and explicit about the requirements for promotion, managers are less likely to allow their personal preferences or biases to unfairly influence the decision.

Recognize the necessity of long-term dedication. There are no quick fixes to entrenched stereotypes and gender discrimination. Sustainable, systemic change is only possible when change agents adopt the long-term perspective and recognize that cultural change requires ongoing effort and vigilance.

Strategies Discussed

The issues that affect the attraction, retention, and success of women at medium and large tech corporations are complex and multidimensional, and as such, they must be addressed with multidimensional strategies. These strategies often overlap; outlined below, in semi-linear order, are some of the most effective strategies for improving conditions:

Ongoing Strategies

Establishing Baselines and Collecting and Tracking Data. It is impossible to know if progress has been made unless companies use metrics to establish benchmarks. Tracking data allows for the implementation of accountability measures, both for employees who fail to track or report the pertinent information, and for those who fail

Ongoing	Pre-Application Period	Hiring Process	Following Hiring
• Collect and track data • Implement strong work-life policies • Eliminate ambiguity in policies	• Cultivate company reputation • Review and revise job descriptions	• Diversify the hiring committee • Codify hiring criteria • Mandate at least one woman be interviewed	• Codify advancement and compensation criteria • Implement strong work-life policies

to improve their metrics.

Companies can and should:

- Conduct internal engagement surveys;

- Examine and collect information on workforce composition;

- Examine and collect information on recruiting practices;

- Examine and collect information on hiring practices;

- Examine and collect information on compensation statistics;

- Examine and collect information on retention rates;

- And speak to female employees about their experiences.

Ensuring transparency with collected data can foster substantial improvements regarding gendered conditions at tech companies. Certain data on current numbers and progress should be available to targeted audiences. For example, at eBay, an internal presentation to all Senior Vice-Presidents (SVPs) provides insight on their respective departments' diversity. Sharing this information internally does not hold any individual executive more accountable than others, but it can spur competition amongst them to improve their own departments (and as mentioned in best practices, top down effort is important).

Releasing statistics to the public is also an important strategy to prove company dedication to the cause. Transparency about conditions and efforts sends a strong signal to potential applicants that the company is open, honest, and genuinely working to improve the gender gap. Furthermore, it signals that the company is sincerely holding itself accountable, as their successes and challenges to improve conditions will be publicly recognized.

"Then what we do is we actually just rank order by bar charts how the women fall out in each of these SVPs. It does spur the sense of innate competition like no one really wants to be the smallest bar at the bottom of the chart. Even if this isn't like their particular issue we have leaders that are all at all ranges of the change curve. Even for those leaders who aren't passionate advocates for this, they still don't want to be the person at the bottom of the chart."

-Michelle Angier

Though it invites public scrutiny, transparency is one way to improve accountability, as is establishing baselines and tracking metrics. Another is by codifying requirements for hiring, interviewing, and advancements. By codifying such metrics, those who fail to comply can face formal censure or consequences.

In codifying practices, it is critical that companies deliberately avoid ambiguity. Ambiguity is often the gateway for the expression of bias. Where standards are not clear and documented, people will allow their biases to influence the way they hire, evaluate, promote, and treat people.

Pre-Application Period Strategies

Corporate companies can initiate gender equity measures prior to the interview process.

Cultivating reputations of equality affords companies the opportunity to improve the diversity of their applicant pool. One way to build a reputation of equality includes the aforementioned transparency of diversity efforts. Sharing all data, including successes and setbacks, signals the company's authenticity about their efforts while underscoring their honesty and supportive nature in addressing difficulties.

 Other ways to improve company reputation and attract more female applicants includes:

"If you have these expectations that are borne of stereotypes, ambiguity just allows them to flourish. If there's not a lot of information, people fill in the blanks with what they expect to happen. It's critical that there be a lot of information and that it be relevant to the decision that is being made. That doesn't always happen in these selection decisions."

-Madeline Heilman

- Promote public appearances of female executives at conferences, events, and high-level meetings; this signals that women are not only welcome but can also advance professionally within the company.

- Reform recruiting pitches to reduce or eliminate language that actively attracts men and discourages women (i.e. eliminate the "brogrammer" pitch that focuses on male-centric incentives and predominately uses masculine pronouns.).

Another crucial strategy in attraction efforts is to construct careful, deliberate role characterizations and job descriptions.

- Eliminate phrases that focus on male-oriented characteristics (e.g. "aggressive").

- Make it clear that candidate criteria are a "wish-list," and that people are encouraged to apply if they think they can satisfy job requirements, even if they do not meet all skills listed.

- Remove gendered pronouns.

- Indicate support for employee skill development and life balance; include work-life policies in the description.

Application and Hiring Process

During the application and interview process, women are routinely subjected to a variety of barriers. There are several strategies to improve equity during this process. Strategies for improving the application process include:

- Where possible, implement blind résumé screening processes.

- Mandate diversity in the hiring committee.

- Require that at least one qualified woman be interviewed. This is not the same as setting hiring quotas, but ensures diversity in the candidate pool.

Ambiguity can be avoided at this stage by deliberately structuring candidate interviews and evaluative criteria.

- Train hiring committees to recognize and avoid common biases. For example, women are often inclined to describe their work as collaborative, whereas men are more likely to take individual credit. Hiring committees or managers must learn to recognize this tendency.

- Outline pertinent information to be attained in an interview, and maintain consistency across all interviews for the same position. This helps circumvent confirmation bias.

- Require managers explain their hiring decisions. This will push managers out of autopilot mode—in which unconscious biases flourish. If managers verbally account for why one candidate was chosen over another, then they have to confront their own perceptions and the underlying reasons for them.

Structured Evaluative Criteria for Performance Reviews, Promotions, and Raises

- Clear criteria: where negotiations are taking place, the criteria for promotion must be explicit to hinder managers from penalizing women based on personal biases.

- Eliminating Salary Negotiations: these negotiations are proven to have very unfair ramifications; some companies are considering eliminating these types of negotiations altogether.

Identifying Stakeholders and Influencers

- In order to strategize appropriate culture change efforts, it is valuable to map out stakeholders and their influence on company culture.

"You need lots of partners and lots of allies in the company. We do need to recognize that there are different people that are in different stages of their change journey. One of the things that I do is that I actually map that out internally. To say look here are our leaders and here is how I think they are and their change journey. Depending on where they are and their change journey it makes sense to engage them in different ways."

-Michelle Angier

One way to support the retention of women in tech is to implement programs to develop and advance their careers. Such programs can take one of several forms, including:

- Provide opportunities for women to extend their networks and connect with others at work and elsewhere.

- Create both mentorship and sponsorship through formal or informal matching.

- Provide opportunities for women to develop both technological and other professional skills. These programs should be structured to accommodate women's tendency to not to self-nominate for awards and programs (e.g. by making professional development opportunities mandatory for all women in certain positions, or requiring colleagues to nominate each other).

Acknowledgments

Conference Lead Sponsors

Google's and Cisco's event sponsorship included support for this conference outcome report.

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Colleen Callahan* - Deputy Director, Luskin Center

J.R. DeShazo - Director, Luskin Center

Davida Johnson* - Director, Community Partnership Programs, Office of Information Technology

Stefanie Pietkiewicz - Project Manager, Community Partnership Programs, OIT

Chloe Reynolds - Senior Business Systems Analyst, UCLA Information Technology Services

Alejandro Rioja - Student Assistant, Luskin Center

Rebecca Sadwick* - Project Manager, Digital Tech Initiative, Luskin Center

Kiana Taheri - Researcher, Digital Tech Initiative, Luskin Center

John Villasenor - Researcher, Luskin Center, Stanford University, and The Brookings Institution

Christian Zarate - Office Manager, Events Coordinator, Special Projects, Luskin Center

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Brooke Hunter - as Chief Operating Officer, Engine

Denise Gammal - Senior Director, Diversity, Inclusion and Talent Innovation, Exponential Talent

Conference Speakers

WELCOME AND OPENING REMARKS

J.R. DeShazo - Director, UCLA Luskin Center for Innovation

Davida Johnson - Director, Community Partners Program, UCLA OIT

WELCOME FROM LOS ANGELES MAYOR'S OFFICE

Nancy Perlman - Goldhirsh Fellow, Technology & Innovation, Office of LA Mayor Eric Garcetti

OPENING KEYNOTE

Sue Gardner - Former Executive Director, Wikimedia Foundation

KEYNOTE PLENARY

John Villasenor - Researcher, Stanford University, The Brookings Institution, and UCLA *(Moderator)*

Valerie Aurora - Co-founder and Director of Training, Ada Initiative

Jane Margolis - Senior Researcher and Author, UCLA Graduate School of Education and Information Studies

Monique Morrow - Chief Technology Officer, Cisco Systems, Inc.

Track 1.1: Accelerators, Incubators, and Other Startup Resources

Kevin Lew - Director, Bixel Exchange, Los Angeles Area Chamber of Commerce *(Moderator)*

Tina Denuit-Wojcik - Chief Technology Officer, Enplug, Inc.

Espree Devora - Vice President of Communications, WeAreLATech

Jess Erickson - Director of Marketing, 500 Startups

Linda Moore - President and Chief Executive Officer, TechNet

Track 2.1: Corporate and Public Policies to Attract Women to Tech Jobs

Katherine Oyama - Senior Policy Counsel, Google, Inc. *(Moderator)*

Madeline Heilman - Professor and Author, New York University

Brooke Hunter - Chief Operating Officer, Engine, Inc.

Victoria O'Seni - Chief of Staff, Information Technology, Creative Artists Agency

Susan Palm - Vice President, MetricStream, Inc.

Track 1.2: Startup Funding Pipeline

Leigh Honeywell - Platform Security Engineer, Heroku *(Moderator)*

Erin Flynn - Principal, Ackrell Capital, LLC

Melinda Moore - Chief Marketing Officer, Crowdfunder, Inc.

Louis Stewart - Deputy Director of Innovation and Entrepreneurship, Governor's Office of Business and Economic Development

Sophia Viklund - Founder and Head of Strategic Relations, backCODE, Inc.

Track 2.2: Policies for Building Retention

Lisa Conn - National Organizing Director, FWD.us *(Moderator)*

Michelle Angier - Director of Women's Initiative Network, eBay, Inc.

Tiffany Crawford - Founder and Chief Executive Officer, CREATE Leadership Institute, Inc.

Denise Gammal - Senior Director, Diversity and Inclusion, Exponential Talent, LLC

Shelley Zalis - Chief Executive Officer, Ipsos OTX

LUNCH KEYNOTE

Davida Johnson - Director, Community Partners Program, UCLA OIT *(Introduction)*

Adaora Udoji - Chief Executive Officer and Founder, outLoud, Inc. *(Lunch Keynote)*

KEYNOTE ADDRESS

Krisztina 'Z' Holly - Entrepreneur-In-Residence, Office of LA Mayor Eric Garcetti

CLOSING REMARKS

Rebecca Sadwick - Project Manager, Digital Tech Initiative, UCLA Luskin Center for Innovation

Conference Discussion Leaders: Fostering Women Entrepreneurs and Leaders in Startups, Small Firms and Organizations

Tara Tiger Brown - Co-founder, LA Makerspace, KitHub, and Connected Camps

Colleen Callahan - Deputy Director, UCLA Luskin Center *(Track Facilitator)*

Mylea Charvat - CEO and Founder, Savonix

Yasi Chehroudi - Product Manager, Cornerstone onDemand

Lisa deSouza - President and CEO, RPM Demand; Founder, SoCal Digital Symposium

Catherine Geanuracos - Chief Marketing Officer, Science 37

Julie Thorne Engels - CEO and Partner, TribeMint

Bambi Francisco - Founder and CEO, Vator

Tynishia Goodlow - Office Manager, Originate

Doreen Hakimi - Software Engineer, Originate

Angie Hayden - Experience Designer, Originate

Liz Heller - Founder, Buzztone

Davida Johnson - Director of Community Programs, UCLA OIT *(Track Facilitator)*

Kate Lyness - Operations Manager, Originate

Kayla Meyer - Recruiting Coordinator, Originate

Ezra Roizen - Partner, Ackrell Capital

Jessica Willison - Co-founder & Chief Communications Officer, Enrou

Rachel Wolfson - Content Marketing Manager, Moogsoft

Conference Discussion Leaders: Attracting and Retaining Women in Medium and Large Companies and Organizations

Rhianon Anderson - Researcher, Digital Tech Initiative, UCLA Luskin Center

Asthana Anupuma - Director of Engineering Systems, Broadcom

Cathy Daoust - Executive Director, IT Development and Learning, Sony Pictures

Kimberly Freeman - Asst. Dean of Diversity and Outreach, UCLA Anderson School of Management *(Track Facilitator)*

Michelle Garakian - Office of Economic Development, Office of LA Mayor Eric Garcetti

Rachel Horning - Policy Associate, BizFed LA

Frances Joseph - VP of Institutional Equity Research Sales, Bank of America Merrill Lynch

Marina Lee - CEO and Founder, Women In Tech Network & MIDA's 1 Million Movement

Stefanie Pietkiewicz - Project Manager, OIT Community Partnerships Programs

Chloe Reynolds - Senior Business Systems Analyst, UCLA IT Services

Jackie Reynolds - CIO, UCLA Anderson School of Management *(Track Facilitator)*

Rebecca Sadwick - Project Manager, Digital Tech Initiative, UCLA Luskin Center

Amy Washburn - Product Manager, William O'Neill

Robyn Weisman - Tech Solutions Marketing Consultant, B2B Enterprise

Macala Wright - Digital Journalist & Strategist, PSFK, Mashable & Canvas8

Company Glossary

The table below describes the companies explicitly discussed in the literature review section of this report. Please note, this table is by no means exhaustive, and there are numerous other companies with diversity initiatives. The purpose of this list is to provide an easy-to-read reference tool that outlines companies with diversity initiatives, based entirely on the corporate examples in our literature review.

Company	Diversity Initiatives and Strategies*	Source[s]
Cisco	1) Recruits young women, working heavily with middle school girls 2) Founding member of the US2020 mentorship program 3) Provides different programs catered to lower and high level female employees 4) Actively tracking progress using employee surveys	Cisco's plan to solve tech's diversity problem: Start from the top (Fairchild, 2015)
eBay	1) Measures gender diversity progress by business, function and region 2) Reviews hiring, promotion, and attrition data for female leaders	Steps Tech Companies Can Take to Increase Gender Diversity (Ann, 2015)
Google	1) Asks interviewers to report interviewees' answers in greater detail 2) Women interviewees will interact with other women amid the hiring process	Google Hiring Data Reveals Two Things Women Can Do To Get Hired And Promoted More (Carlson & Miller, 2015)
Intel	1) Launched a $300 million dollar diversity initiative 2) Funds programs that teach STEM in underserved areas 3) Invests in women and minority-owned companies 4) Revising hiring and retention incentives and programs to encourage diversity within Intel 5) Collaborating with others in the tech industry to improve diversity in tech	The powerful woman behind Intel's new $ 300 million diversity initiative (Plus, 2015)
Microsoft	1) Hosts recruiting events to encourage young women to pursue STEM and work at Microsoft 2) Women's History Month 3) Hosts networking events 4) The bi-annual Women' Leadership and development conference 5) Women at Microsoft Employee Resource Group	Microsoft's website

*This column provides an example of diversity efforts used by mentioned companies. This not a complete list of all initiatives.

Company	Diversity Initiatives and Strategies*	Source[s]
Symantec	1) Set a goal of reaching 30 percent female representation for their board of directors 2) Expanded board of director search criteria to include more than just past CEO experience	Steps Tech Companies Can Take to Increase Gender Diversity (Ann, 2015)
Twitter	1) Sponsored and partnered with organizations that advance women and minorities in technology, such as Girls Who Code and Girl Geek Dinners 2) Contains employee groups that have a diversity focus 3) Provides bias mitigation training	90 percent of Twitter's Tech Employees are Male (Linshi, 2014), Building a Twitter we can be proud of (Van Huysse, 2014)

*This column provides an example of diversity efforts used by mentioned companies. This not a complete list of all initiatives.
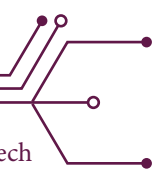
Non-Profit Organization Glossary

The table below lists non-profit organizations frequently mentioned in the sources from our literature review. Please note, this table is by no means exhaustive, there are numerous organizations not listed that support corporate gender diversity. The purpose of this list is to provide an easy-to-read reference tool that outlines popular non-profits, based solely on the articles in our literature review.

Name	Involved Companies*	Organizational Focus	URL
Anita Borg Institute	Google, HP, Microsoft	Recruitment of women in technology, supporting female leadership	http://anitaborg.org
Black Girls Code	Google, Verizon, Twitter	Training and educational programming for girls of color	http://www.blackgirlscode.com
Code2040	Etsy, Google for Entrepreneurs, LinkedIn	Promotes racial diversity in tech hiring	http://www.code2040.org
Girls Who Code	Twitter, Microsoft, Adobe Foundation	Training and educational programming	http://girlswhocode.com
National Center for Women & Information Technology (NCWIT)	Apple, Microsoft, Google	Increase female participation in computing and technology	https://www.ncwit.org
U.S. 20/20	Cisco, SanDisk, Texas Instruments	Mentoring	https://www.us2020.org

*This column provides an example of the corporate involvement associated with select non-profit organizations. Please note that this is not a complete list of supporting corporate organizations.

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