ANITA BORG INSTITUTE

WOMEN TRANSFORMING TECHNOLOGY

WOMEN TECHNOLOGISTS COUNT

Recommendations and Best Practices to Retain Women in Computing

ANITA BORG INSTITUTE SOLUTIONS SERIES

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FOREWORD

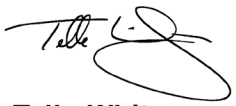
Over the past 15 years, as the Anita Borg Institute has worked to improve the representation and advancement of women in computing, we've learned how important it is to retain women in the technical career pipeline. We know from our work with organizations that turnover among women in technology is a significant problem. Companies recognize that they cannot afford to lose valuable talent, but making a tangible impact on attrition levels can be challenging.

Attrition begins when some women struggle in the transition from college to their first technical position in industry. For those who stay initially, the mid level is an especially critical "make or break" point. Many mid-level women leave the technical track to become managers. Others switch companies or step away from technology altogether. Those who advance to senior technical roles face many obstacles as they work toward the top tiers of technical leadership.

Keeping women in the technical workforce matters. Teams that have a diversity of perspective, including gender, improve innovation and, ultimately, financial performance. It is in the best interest of technology companies to retain women who are committed to inventing technology and making a contribution in their fields.

To institute real change in the workplace, employees throughout the organization need to understand that including people with a broad range of perspective, background and gender is a business imperative. Grassroots movements, even the most energized, aren't enough to solve the retention problem nor is the personal advocacy of a CEO. Managers at every level should know and commit to improving their gender and retention metrics. As part of the process, organizations need to take some big and many little daily steps to evolve their workplace practices to welcome and leverage women's contributions.

In this paper, we present actionable retention solutions that are relevant to a broad audience. Whatever your role in the organization, I hope that this paper informs and inspires you to initiate important conversations within your company and to develop practices that improve the representation and advancement of women technologists. The Anita Borg Institute stands ready to help you along the journey.



Telle Whitney
President and CEO
Anita Borg Institute

INTRODUCTION

"Diversity isn't an altruistic aspiration; it's a competitive demand."

BILL DESTLER, PRESIDENT, ROCHESTER INSTITUTE OF TECHNOLOGY, 2013[1]

Employee Turnover is Expensive

Employee turnover has many costs. Research indicates that direct replacement costs can reach 50% to 60% of an employee's annual salary, with total costs associated with turnover ranging from 90% to 200% of annual salary.[2]

For technology companies, turnover jeopardizes innovation, productivity, and competitiveness. When technical teams are disrupted, there can be a cascading effect, with several key contributors leaving the company. Talent-driven organizations recognize that their ability to succeed as a business in the knowledge economy is grounded in their human capital, and that turnover is a main source of disruption in this capital.[3]

To attract and retain coveted technical talent, top technology companies are offering employees a panoply of benefits and lavish perks that range from free gourmet meals to convenient personal and household services. Many companies believe that creating a supportive and fun work environment encourages creativity and productivity.

Despite these employee incentives, women leave technology companies at twice the rate of men. This attrition among women technologists creates a big problem for employers. Several studies have shown that mixed gender teams are more innovative, creative, and productive.[4] Companies with women in leadership and decision-making positions have greater profits, sales and revenue growth.[5] Given the smaller pipeline of women technologists available to contribute their expertise and perspectives to technical innovation (less than 20% of undergraduate engineering and computer science majors in the U.S. are women), technology companies have a major incentive to stem the tide of turnover among technical women.

What We Know About Turnover Rates Among Women Technologists

One of the first leaks in the technical pipeline occurs as women transition from college to career. A study of women with engineering degrees found that 15% of women who graduated with a degree in engineering did not enter the profession after graduating, and another 20% entered engineering careers but then left the profession. The vast majority of these women are still in the workforce, but working in other fields.[7]

A study of women in technical and scientific occupations found that 52% of women entering science and technology careers left private companies over time, and that attrition increases markedly at the mid-career point. In the technology sector, 56% of women in these occupations left over time with cumulative quit rates for women more than double the rate for men.[8]

Voluntary turnover is increasing as unemployment drops and the economy recovers.[9] High-performing women are especially at risk, since they are highly sought after and have high expectations of their employer in terms of engagement and opportunities for advancement.[10]

Women's Representation in STEM Degrees Awarded in the US, 2010[6]

	Bachelor's		Master's		Doctoral	
Computer Science	7,306	18.2%	4,963	27.5%	336	21.5%
Electrical Engineering	1,740	10.7%	2,410	19.9%	382	17.6%
All Engineering	13,693	18.4%	8,402	22.3%	1,815	23.2%

Source: The Anita Borg Institute from National Science Foundation data (NSF, 2013)

The Anita Borg Institute's Top Company for Women in Computing Award benchmarking indicates that there is increasing volatility in voluntary turnover rates for women technologists as the economy improves. While participating companies had a median of 5% voluntary turnover in both 2009 and 2010, we saw a jump in the median rate for participants in 2011 to 10%. Despite the increased median rate, ABI data show that some companies are able to achieve and maintain very low turnover. This speaks volumes about companies' ongoing efforts to retain women in technology roles and demonstrates that improved retention is possible.

Why Women Leave Technical Jobs

A study that included over 1,000 women who worked in engineering and then left the field cited the following top reasons for leaving engineering jobs[11]:

- Working conditions: no advancement, too many hours or low salary (30%)
- Work-life integration: wanted more time with family, conflict with family or too much travel (27%)
- Didn't like the work: lost interest or didn't like daily tasks (22%)
- Organizational climate: didn't like culture, boss or coworkers (17%)

There is a compelling business case for addressing the key barriers that women technologists face in the workplace. These include the lack of opportunities for recognition and advancement, the challenges of integrating work and life demands, and the isolation and unconscious biases women often experience in a male-dominated workplace.

How This Report Can Help

This second report in the Anita Borg Institute Solutions Series[12] utilizes the best research on gender and retention to offer 10 recommendations for improving the retention of women in the technical workforce. These solutions include "bottom up" or grassroots efforts that women in technology roles can implement, "top down" initiatives that require the commitment of company leadership, and workforce policy or system changes that support retention.

A company focused on retaining its female technical talent should draw upon solutions from each of these categories to stay competitive, always selecting and adapting the specific options that fit the company's unique challenges, resources, and context. Many companies demonstrate success in a few key areas to build support and then are able to evolve a portfolio of programs and system changes that foster a more inclusive workplace. To illustrate how companies have integrated some of these research-based recommendations into their practices and programs, we feature in this report evidence-based best practices from several companies that are achieving real success in retaining women technologists and harnessing the full power of diverse teams.[13]

WOMEN TECHNOLOGISTS COUNT: RECOMMENDATIONS AND BEST PRACTICES TO RETAIN WOMEN IN COMPUTING

For technology companies, turnover jeopardizes innovation, productivity, and competitiveness. Women technologists leave their companies at twice the rate of men, creating a special challenge to retain talent that is crucial to provide the diversity of perspectives that drive innovation. As the demand for top technical talent continues to outpace the number of graduates each year, leaders and managers must develop and foster a workplace culture that enables them to develop and retain women in technical roles. The Anita Borg Institute offers a set of retention recommendations that are based on academic research, sector knowledge and evidence-based best practices from leading organizations. The recommendations below provide a blueprint to help leaders, managers, and HR specialists to retain women technologists.

LEADERSHIP AND ACCOUNTABILITY

How a management team can make diversity in technical roles a company priority

1. Collect, analyze and report retention data, specifically as it pertains to women in technical roles.
2. Formally train managers in best practices and hold managers accountable for retention.

CORPORATE CULTURE BUILT FOR INNOVATION

How organizations can develop corporate cultures that embrace inclusion and leverage diversity

3. Embed collaboration in the corporate culture to encourage diverse ideas and perspectives.
4. Offer training programs that raise awareness of and counteract micro-inequities and unconscious biases.
5. Provide development and visibility opportunities to women that increase technical credibility.

SUPPORT NETWORKS AND COMMUNITIES

How companies can encourage women to collaborate and support each other

6. Fund and support workshops, conferences and other group events that focus on the specific career path experiences and challenges faced by women technologists.
7. Establish mentoring programs to provide advice on technical and career development.
8. Sponsor employee resource groups to provide opportunities for mutual support, learning and networking.

ORGANIZATIONAL INFRASTRUCTURE AND POLICIES

How companies can make systemic changes that increase the retention of women in technical roles

9. Institute flexible work arrangements and tools that facilitate work-life integration.
10. Enact employee leave policies and provide services that support work-life integration.

LEADERSHIP AND ACCOUNTABILITY

"Executives realize the race for talent is one they cannot afford to lose. Yet all too few of them grasp the far-reaching changes needed to become a truly talent-driven firm—changes not just to strategy, organization, operations, and technology, but to the more basic dispositions underlying today's managerial actions, practices, and interventions."

JOHN HAGEL, JOHN SEELY BROWN, AND LANG DAVISON, "TALENT IS EVERYTHING," 2009[14]

How a management team can make diversity in technical roles a company priority

Attracting and retaining a diverse technical workforce requires participation well beyond the HR and diversity and inclusion teams. Executive management must lead the way by showing a clear commitment to programs and goals that can be measured and objectively evaluated. Initiatives that focus on retaining women technologists must be reinforced throughout the ranks of managers, since they are responsible for hiring, managing, and advancing employees.

The composition of a company's technical leadership speaks volumes about its commitment to diversity in technical roles. A homogeneous leadership team that does not include senior women signals a potential dearth of advancement avenues and is likely to hurt the retention of upwardly mobile women technologists. Research shows that diversity in senior management positions predicts diversity of the overall workforce and the adoption of diversity practices,[15] and that female role models positively affect the retention of women in science, technology, engineering and mathematics (STEM).[16]

Recommendation 1. Collect, analyze, and report retention data, specifically as it pertains to women in technical roles.

Measurement is a critical component of designing an effective diversity and retention strategy.[17] Analyzing data on the representation, retention and advancement of women within the technical workforce is an important starting point to develop a retention strategy. The main reason to benchmark women specifically is that they are critical to the technical innovation process; they are severely underrepresented at all levels and therefore face specific challenges.[18] Metrics that should be collected and tracked include voluntary turnover rates, promotion rates, and representation of women at all levels of the company. We also recommend that companies survey employees to track engagement and identify root causes of employee turnover. The systematic review of data is a key part of designing the right evidence-based solutions.[19]

One such measurement mechanism has been designed by the Anita Borg Institute: the Top Company for Women in Computing Award. This initiative helps participating companies determine their baseline and track progress to improve the recruitment, retention and advancement of their women technologists against industry and peer benchmarks. (For more information on the Top Company for Women in Computing Award initiative visit www.anitaborg.org/top-company-award/)

Company executives should work with HR to establish regular reviews of satisfaction, engagement and retention data cut by both gender and technical roles. They may find that advancement and retention problems are most acute in particular job categories, career levels, career tracks, or departments.

Once collected and analyzed, these data are only effective in driving change when they are shared and acted upon by company leaders and managers with strong accountability mechanisms.

Questions Companies Should Ask To Assess Retention Rates Among Women Technologists

Are retention rates similar for men and women in similar technology positions?

Are turnover rates different across levels (for instance, mid-career vs. senior level)?

Are retention rates for women technologists worse in a specific division, group, or technical role?

Are retention rates for women in technical roles low in a specific campus, business unit, or team that may require a specific cultural intervention with managers or teams?

Are retention rates for women technologists high in a specific division or group where best practices might be found that are replicable elsewhere in the company?

How do the company's retention rates for women technologists in various geographical locations benchmark against peers and competitors?

Recommendation 2. Formally train managers in best practices and hold managers accountable for retention.

"People leave managers, not companies" was the finding of one study in which 70% of top talent cited their manager as the primary reason for leaving.[20] Inversely, employees may stay at a company because of a supportive manager, even when their attachment to the organization is low.[21]

For women in technical roles, managerial support is especially important, as women often experience unconscious bias and additional barriers to advancement. Women technologists who we have interviewed[22] describe how they carefully select their managers as they advance, looking for managers who "get it" and will respect and support their contributions and advancement. Perceptions of unfairness in assignments, promotion, and compensation are important predictors of employee turnover.[23] One study showed that even in a performance-based evaluation system based on meritocratic principles, women received less pay than men for equal performance evaluations.[24]

Since managers have such a strong impact on the retention of women in technical roles, it's essential that management training and development incorporate tools to actively encourage collaboration, inclusiveness, and diversity in the workplace. Achievement of retention goals should be part of a manager's performance evaluation, and managers should be given incentives to take an interest in the professional development of the women technologists reporting to them. Research shows that when managers are held accountable and have to be transparent about the performance evaluation, bias is less likely to occur or is likely to be corrected.[25] Management accountability clearly signals the cultural importance of employee retention within the organization.

A company's goals for talent retention should be realistic and specific (e.g. improve department A's retention of high potential technical talent from X% to Y%). Many companies that have effectively retained and advanced women in technical roles—including all winners of the Anita Borg Institute Top Company for Women in Computing Award—have utilized tools such as dashboards or scorecards that provide company managers with detailed data on diversity performance and goals at the manager or department level.

As company leaders establish strategic goals and develop accountability for retention, they should also provide the right infrastructure to support managers in reaching these goals, such as manager training, professional development for technologists, career planning frameworks, and supportive work-life integration policies. Improving manager skills is a good retention investment.

CORPORATE CULTURE BUILT FOR INNOVATION

"Best-in-class organizations have… begun looking for ways to measure the global P&L impact of collaborative projects and reward leaders accordingly, even if those projects result in lower P&L for the manager's own business unit."

RICK LASH, "THE COLLABORATION IMPERATIVE," 2012[26]

How organizations can develop corporate cultures that embrace inclusion and leverage diversity

Computing and engineering cultures have been shown to be traditionally characterized by masculine, white, and antisocial behavior.[27] This "geek" stereotype discourages women from pursuing careers in the field. A study spanning 30 years of female engineering graduates who chose not to enter the field upon graduation shows that "culture" is among the top three reasons women do not pursue a career within their field of training.[28] To retain women and fully leverage their potential, companies should proactively develop a more collaborative culture and workplace behaviors.

Recommendation 3. Embed collaboration in the corporate culture to encourage diverse ideas and perspectives.

Companies that want to reap the full benefits of including more women (such as innovation and enhanced performance), should create a corporate culture that welcomes different points of view—in other words, a culture of collaboration. Maintaining a collaborative culture is an ongoing challenge for many companies. Teams with a broader mix of gender, background and perspective can make collaboration more difficult to achieve, since reaching a consensus is more difficult when there are many divergent points of view. Because women technologists are typically greatly outnumbered by their male counterparts, they may be more likely to suffer negative consequences when they express a new or different perspective.

Organizations should establish a workplace environment where divergent ideas can be safely expressed without fear of negative consequences.[29] By doing so, they will not only improve job satisfaction for their women in technical roles, but also benefit from fresh ideas and approaches to solving important problems. Some ways that companies can foster a culture of collaboration include:

- Model behavior at the leadership level that shows diverging ideas and opinions are valued and heard;
- Hire employees who score high on collaborative skills and encourage and reward teamwork;
- Implement processes by which all ideas can be heard, not just the loudest or most influential voices; and
- Develop a reward structure that encourages collaboration over competition and rewards long-term success over individual short-term success.[30]

Recommendation 4. Offer training programs that raise awareness of and counteract micro-inequities and unconscious biases.

The repeated experience of micro-inequities, the frequent unintentional slights women experience in the workplace, is sometimes compared to "death by a thousand cuts." Even in comparatively inclusive organizational cultures, women technologists often experience micro-inequities, which, over time, can contribute to employee turnover.[31] Experiences of being treated in a condescending manner or unfairly by supervisors or colleagues on a regular basis have been found to be a key reason why women engineers leave companies.[32] Micro-inequities are usually not the result of bad intentions. Like larger inequities, they are the result of unconscious biases. To retain their valued women employees, companies need to be attuned to and actively counter this kind of demeaning behavior.

Leaders, managers and individual contributors can test their own unconscious biases and start conversations about it within their organizations. The Implicit Association Test (https://implicit.harvard.edu/) at Harvard University provides useful online experiments to test an individual's implicit biases along several dimensions. We also suggest that managers view the video "Creating a Level Playing Field" in which Stanford Professor Shelley Correll explains how stereotypes act as a shortcut in information processing (www.leanin.org).

Some companies are experimenting to develop training for their leaders and managers on understanding and

mitigating the effects of implicit bias on their decisions and behaviors. We recommend companies seek the help of social scientists with specific expertise in gender bias issues to develop such training.

Some companies are also helping women learn how to counter biases when they experience these challenges. For example, Intel has developed training that helps women technologists learn to be more visible in challenging, male-dominated workplace environments.

Developing Career Skills: Intel's Command Presence Workshop

Command Presence is a course developed to help improve technical women's confidence while presenting in task force and technical review meetings to senior and executive level audiences. When we asked our female Fellows, Kelin Kuhn and Genevieve Bell, what may be potential barriers in the advancement of women in technical roles at Intel, they both suggested women needed more experience presenting in and leading intense, male dominated meetings with confidence. This is especially true as they transition from the mid-level to senior and executive roles.

Kelin stepped forward in 2009 to partner with Rosalind Hudnell, Chief Diversity Officer, and Lori Wilson, Women's Initiative Manager, to create the Command Presence Workshop for women at Intel in 2009. To be successful in a senior-level environment, "you don't necessarily have to play the game, but you must understand how the game is played," Kelin said. Once the women understand what is happening and why, they can manage their delivery appropriately and build confidence, and it takes practice. The four-hour workshop is an intensive, often uncomfortable session that attempts to reproduce challenging dynamics that can take place at the senior level. It helps women build confidence when presenting during intense meetings and gain increased respect and recognition in the workplace. Kelin observes, "It's an edgy class. If people leave feeling warm and fuzzy, we didn't do our jobs. We want to expose the students in the class to a real dynamic that exists, especially in crisis situations."

Key Elements for Success:

- The content was designed by women technologists for women technologists in collaboration with Human Resources (HR).
- The workshop is highly interactive, with specific scenario demonstrations and role-playing by male VPs and Fellows, rather than training professionals.
- The content is real, creating challenging, intimidating, and often uncomfortable situations for participants to experience and discuss with their more senior colleagues.
- The content is relevant to Intel's specific culture and job functions.
- Discussion and learning are based on a framework of "constructive confrontation."
- The workshop is spearheaded by experienced female technical leaders who are familiar with the challenges of, yet still being successful in this environment.

Outcomes:

Beginning in 2009 specifically for senior women technologists, the workshop has become increasingly popular across the Intel population; it is now offered in locations around the globe, taking into account local cultural nuances.

- The workshop has reached more than 200 women since its inception.
- The goal of this event is to help increase the number of female technical leaders.
- An unexpected result of the event is that it has turned into a reverse mentoring /learning opportunity for the leaders who provide coaching for the women. These leaders have anxiously asked to be invited back to participate in future sessions.
- Because the course has received such rave reviews and has demand from Intel's mid-level women technologists, an "Introduction to Command Presence" workshop has been created for mid-level women in technology roles, which will be piloted in Q4 2013.

Recommendation 5. Provide development and visibility opportunities to women that increase technical credibility.

Being connected to powerful others and being visible for accomplishments are two of the most critical predictors of advancement for women.[33] Technical credibility and recognition within the organization are especially important for women to advance in the technical track. Failure to advance women is directly connected to turnover. A lack of advancement opportunities is among the most significant predictors of turnover for women technologists.[34]

Building technical credibility is even more crucial for women than for their male colleagues. Because of unconscious bias, women are less likely to be perceived as technically competent compared to their male counterparts.[35] Opportunities to establish technical authority can include taking on challenging or high-visibility technical projects, leading technical teams, patenting inventions, and publishing high-profile technical papers.

Managers and mentors can help women technologists grasp such opportunities by advocating on their behalf, encouraging them to put their ideas forward, connecting them to influential others, and funding their presentations at important internal and external events. Participation on internal task forces, advisory committees or professional boards extends networks and builds technical credibility. These activities build both visibility and skill sets for the employees. Just as importantly, fostering women's participation in these internal and external activities helps the organization to realize the innovation benefits of women's inclusion.

Some companies have implemented specific development opportunities targeted to advance employees along the technical path. Women technologists at IBM created a grassroots resource group that not only shares knowledge on how to patent but also leads to numerous collaborations.

Building Community for Career Development: The IBM Women Inventors Community

When IBM's Pam Nesbitt, now a Senior Technical Staff Member, went before a review board with her first patent disclosure, she noticed that she was one of the only women in the room. Concerned that few of IBM's women technologists were bringing their ideas forward for patents, she founded a grassroots effort to change this, spearheading the IBM Women Inventors Community in 2006. The group's mission is to provide an enriching supportive community of inventors and mentors as well as a think-tank environment where small groups of mutually interested, yet globally or organizationally dispersed people, commune in small clusters to come up with interesting ideas on specialized or wide-ranging topics. The group was an instant sensation, drawing female participants from IBM's campuses around the globe.

Key Elements for Success:

- After the first year, a core team created the wiki and organized the lecture series for female inventors until it became self supporting.
- The community encourages new inventors, helping them believe in their ideas and develop ideas into patents.
- The community is global, connecting women with diverse perspectives including sub-communities in China and India
- Global brainstorming groups are created leading to new, often better innovations due to the diversity of global perspectives and experiences.
- An international network of fellow employees offers advice, mentorship, and support on patenting.
- Through online workshops members share pertinent knowledge, such as information on the patenting process, understanding the basis of novelty, patenting success stories, career improvement opportunities, and claims writing.

Continued on next page.

- A male executive sponsor hosted the first annual Patent Challenge competition.
- The community is supported by strong male and female inventors including Fran Allen, the first female fellow at IBM and first woman to win the Turing Award.

Outcomes:

The original charter was to run this community as long as it was needed, and the success is such that the leadership committee is considering closing or reducing the activity because the community has largely achieved its purpose of education, encouragement and connection around female patenting:

- Over 1,000 IBM women have been involved in the Women Inventors Community, including female inventors from around the globe.
- The program's members have created more than 800 patent disclosures, about a third of which would typically make it to issue.
- Women inventors frequently serve on and chair the very same review boards that they once rarely approached.

SUPPORT NETWORKS AND COMMUNITIES

"A mentoring culture is a culture of action through learning; it continuously strives to create value at all levels of the organization."

LOIS J. ZACHARY, "CREATING A MENTORING CULTURE: THE ORGANIZATION'S GUIDE," 2005[36]

How companies can encourage women to collaborate and support each other

With so few women technologists in the workforce, they often feel isolated and excluded from influential male-dominated networks.[37] With less access to networks, women miss opportunities to gain visibility, collaborate with others, learn and advance in their fields. Companies that proactively enable networking, mentoring and establishing communities among women technologists take an important step toward improving retention rates.

Recommendation 6. Fund and support workshops, conferences and other group events that focus on the specific career path experiences and challenges faced by women technologists.

Workshops, conferences, and other group events offer women technologists the opportunity to build valuable personal networks and reduce their sense of isolation. When women are able to share the challenges they face, they realize that others face similar issues and can share solutions.

Annual women's conferences have become a best practice at several technology companies. By bringing together junior and senior women—and often men in senior positions—to discuss topics of technology and career development, these companies provide important venues for women to foster networks and improve collaboration. Exposure to senior role models at these events can inspire and encourage women and potentially lay the groundwork for mentoring relationships. Research shows that the presence of role models positively affects organizational commitment and career satisfaction across career stages.[38] Women from the same company but at different campuses have an opportunity to meet and develop an internal network. Bringing women together from all organizational levels encourages networking and mentoring and helps women learn about career opportunities within the organization. Companies with highly dispersed and global workforces can utilize videoconferencing to make these events as inclusive as possible. Cisco Systems has developed an effective model for an annual technical women's forum that actively engages women in their campuses across the globe.

Managers should also support travel to professional events and industry conferences targeting women technologists. They provide venues for attendees to build relationships with like-minded career women and expand their professional networks. Women technologists benefit greatly from the opportunity to discuss career planning and technology advancements, as well as innovations and trends in their industries. Participants typically return to their organizations re-energized and bolstered by newly developed networks. A good example is ABI's Grace Hopper Celebration of Women in Computing, the world's largest gathering of women technologists (www.anitaborg.org/initiatives/ghc/). This conference brings together women technologists from every career stage—from undergraduate students through PhD candidates, from entry-level professionals in industry, academia and government up to executive levels. At the conference, women technologists are able to receive inspiration from role models, network with peers, and learn about professional and technical development. Other conference opportunities are sponsored by professional associations, nonprofits and grassroots movements.

Building Community: The Cisco Women in Technology Forum

Recognizing the importance of fostering community and increasing networks among its technical women, Cisco launched the annual Women in Technology Forum in 2012.

Recommendations for Success:

- **Set clear goals and guidelines.** The committee designs content around three goals: Connect, Empower, Inspire. The team uses a guideline one-pager as a touchstone when making decisions about sessions and speakers.
- **Use technology to expand dialogue and reach.** Cisco livestreams headquarters content so that women technologists across locations can actively participate. Videos on Demand are made available after the event. Social media amplifies the community feeling as attendees from around the globe share photos and comments on the event Facebook site.
- **Set the global vision, empower local leadership, enable collaboration.** Campuses host their own local panels and activities in addition to linking to key portions of the headquarters event. Site leaders meet regularly to exchange ideas that work best for their time zones and to share best practices.
- **Ensure diversity in speakers as well as the organizing team.** The committee draws from every function in the company and ranges broadly in career experience to ensure that content is relevant and accessible to women at different career stages
- **Include men at the table.** Men are encouraged to 'lean in' by attending and participating. Male influencers are featured in career panels and sessions.
- **Enlist sponsors of all types.** An array of sponsors can provide funding, open doors or coach session design. One sponsor does not need to do it all.
- **Connect individuals to new people and opportunities.** Birds of a Feather networking, speed "dating," speed mentoring and lunch with executives helps people network, builds the sense of community and offers opportunities to develop mentoring relationships.
- **Empower with internal and industry knowledge.** External speakers bring different perspectives on broad industry trends and career development. Internal speakers discuss company dynamics and share success stories.
- **Inspire by providing visibility to fresh ideas, organizations and role models.** The forum's "Lightning Talks" provide opportunities for women to showcase their technology or project. Visibility at a global level can launch someone's career. Executive speakers can use the visibility as they recruit for their organizations.

Outcomes:

- The Forum served 600 in-person attendees and 800 virtual attendees in the first year, and 1,000 in-person attendees and 400 virtual attendees in the second year.
- Women and male allies participated at 15 Cisco campuses in 6 countries in 2013.
- The conference engaged and connected 150 volunteers.
- The leaders for the forum's Birds of a Feather discussion groups introduced the format to a multi-company collaboration between Cisco, eBay, Intel and others. The Silicon Valley consortium is now planning its fourth event.
- Outcomes have included expanded roles and promotions from event visibility, and new collaborations for internal work and hackathons as well as external conference presentations.
- 99% said the participation in the event was a worthwhile investment in their career development.

The Impact of the Grace Hopper Celebration of Women in Computing

ABI's Grace Hopper Celebration of Women in Computing conference is the largest gathering of women technologists in the world, convening more than 4,000 women in computing annually. The conference content directly addresses the challenges women in technical roles face at every stage of the pipeline. Designed specifically to address gender-based barriers to encourage women in computing, GHC program content includes prominent keynote speakers, technical and career development sessions, a career fair, poster sessions, awards and an open source code-a-thon. ABI's external evaluation of all attendees and an NSF-funded three-year, longitudinal study of scholarship recipients demonstrates the impact of this conference.

A longitudinal study found that GHC motivates female students to choose computing as a major and inspires them to enter and then remain in technical careers[39]:

- Nearly all GHC scholars were still engaged in STEM fields 20 months after attending the conference.
- GHC scholars learned about career and academic opportunities in technical fields and acquired tools to build a successful career.
- About one in five GHC scholars reported receiving a job offer through the conference.
- GHC scholars reported feeling energized and confident about a technical career long after exposure to the conference environment.
- 20 months later, 40 percent of GHC scholars stayed connected with industry professionals and faculty who they met the conference.
- 61 percent of GHC scholars mentored others in their field and 49 percent reached out to high schools to encourage more girls to pursue a computing career.

Among student and career professionals responding to the GHC 2012 evaluation survey[40]:

- 74% agree or strongly agree that the conference has increased their commitment to their chosen career, and
- 91% agree or strongly agree that they felt inspired by the role models they saw at the conference.

Sample Topics from ABI's Grace Hopper Celebration to Guide Event Design

- **Technical learning** – new opportunities in technology, cutting-edge technology trends, advances in the field and code-a-thons
- **Career development** — patenting your innovation, skill development, and getting promoted on the technical path
- **Leadership topics** — managing global teams, developing and leading a technical vision, developing a personal brand and increasing influence and visibility
- **Networking activities and topics** — meet and greet with senior leaders, tips for getting the most out of networking, getting a mentor or a sponsor and "birds of a feather" table topics

Recommendation 7. Establish mentoring programs to provide advice on technical and career development.

Mentoring is the provision of coaching or advice that helps a mentee develop technically and professionally. Long recognized as an advancement tool to develop leadership pipelines, mentoring is also a valuable tool in the retention arsenal. A survey of exemplary formal mentoring programs identified retention as the most commonly cited benefit of mentoring, above advancement.[41] Mentoring can also improve the retention of mentors, increasing their organizational commitment through giving back to others and obtaining recognition.[42]

Women technologists are significantly more likely than men to identify mentoring as a practice that is important for their retention,[43] which makes sense, given women's more frequent experience of isolation and lack of access to the networks that determine advancement.[44] Companies focused on retaining their technical women should either implement formal mentoring programs or support informal mentoring opportunities that provide the technical and career development advice women technologists want and need for advancement.

Research has shown that women especially benefit from having multiple mentoring relationships as it increases their network connections.[45] Female protégés mentored by men report higher career mobility,[46] so it is important

for women to have access to both male and female mentors. Women can be at a disadvantage in securing high-level mentors as men tend to mentor men and women tend to mentor women,[47] thereby reducing women's access to high-level mentoring opportunities in a primarily male workplace.

Formal Mentoring: Best in class formal mentoring programs provide assistance with recruitment, matching, and structuring the developing relationships. Typically, there is a known time commitment of six months or one year as the mentors sign up. An advantage of a formal mentoring program is that it sets uniform expectations for participation and formally enrolls and tracks mentors and mentees to manage the program and measure impact.

A technical report, "Sun Mentoring: 1996-2009," provides a detailed model for implementing a formal mentoring program in a technology company.[48] Some companies have been successful developing formal mentoring programs specifically for women technologists. For example, IBM identifies and develops high potential women in the technical track to retain and build their pipeline of future distinguished engineers.

Informal Mentoring: In the absence of formal matching programs, some companies facilitate informal opportunities, such as mentoring circles, that help employees find the appropriate quality mix of mentoring relationships. Employees have the flexibility to freely enter and exit mentoring relationships as needed over their careers. As with formal mentoring, informal mentoring is most effective when mentors and mentees set out clear goals they want to achieve through mentoring then regularly revisit those and progress against them over time. This can be cost effective, especially for small companies. Companies can foster success by providing tools and resources, such as best practices for effective mentoring, mentor training, and critical topics for advancement.[49]

What Exemplary Fortune 500 Formal Mentoring Programs Share[50]

- Leadership commitment
- Cross-functional design team
- Design that understands employee needs through engagement surveys or focus groups
- Guidelines for the length of the mentoring relationship
- Training materials to guide participants through the mentoring relationship
- Inclusion of a pilot phase before rolling out to the full organization
- Cross-gender participation
- Voluntary participation with screening of mentors and mentees
- Rigorous matching process based on background, experience, development needs and learning goals
- Formal training for mentors and mentees, including an orientation
- Ongoing evaluation and reporting of metrics relevant to the company's strategic goals

Recommendation 8. Sponsor employee resource groups to provide opportunities for mutual support, learning, and networking.

For decades, organizations have recognized the value of Employee Resource Groups (ERGs) to improve retention. These employee groups, supported by the organization, provide opportunities to bring together people with similar characteristics such as gender, ethnicity, sexual orientation, disability or religion. Research shows that ERGs increase "job embeddedness," a key predictor of

Mentoring Future Leaders: IBM's Technical Women's Pipeline Program

In 2010, IBM established the Technical Women Pipeline program to build the pipeline of women technical leaders by working with women technologists earlier in their careers. In three years, this global program has encouraged more than 265 women to stay in the technical track by actively supporting their career development.

Participants include mid- and senior-level women identified as strong potential candidates for leadership growth and the distinguished engineer position. The program combines mentoring and community building in two phases:

1) Seven times each year, a new cohort of 16 high-potential women technologists meets for an intensive two-day, face-to-face workshop. At the workshop they are each paired with an executive advocate and a distinguished engineer coach with whom they work on a series of activities including actionable development plans.

2) Participants from each cohort join a growing network of more than 265 female technologists, building their network, not just through strong relationships with their advocates and coaches, but also through quarterly calls with others in the Pipeline program community. Women are able to share ideas, support and helpful information.

Key Elements for Success:

- Participants are nominated by their business units and managers are actively engaged.
- Participants are educated on what the technical path is and what it takes to succeed.
- The intensive face-to-face workshops for each cohort build strong relationships; both executive advocate and coach will work with the woman for the next three to eight years as they grow in their career.
- Quarterly checkpoints between the IBM employee and her coach, executive advocate, and manager keep the team focused on her development and progress.
- Participants increase their global network with each cohort of 16 women representing 12 or more countries, establishing their credibility globally and across business units.
- The ongoing community is virtual and low cost, enabling the program to be both global and sustainable.
- Participants join new interest groups, develop their understanding of different business units and tackle high-visibility assignments.
- The program's senior executive sponsor is Linda Sanford, Senior Vice President, Enterprise Transformation; high-level support and belief in the need for diversity over the long term protects the program's sustainability.

Outcomes:

For IBM women whose passion is technology, the Technical Women's Pipeline program provides the information and guidance necessary to make their aspirations a reality.

- More than 265 high-potential women technologists have participated at IBM worldwide.
- More than 180 executives, 200 distinguished engineers and all participants' managers are engaged in and support the program.
- The program is increasing the pool of DE-eligible women; 60% of recent female distinguished engineers are program alumni.
- IBM's retention rates for women in the technical path have continued to improve since the program's inception.

retention, by strengthening one's social network within the company.[51] Most ERGs are led by their membership such that the frequency of meetings or events and their content can vary widely among groups within a company as well as from company to company.

While most large companies have a women's group (as well as other diverse employee resource groups), many have yet to create a network specifically for women technologists. Both are important, since many women engineers do not identify or participate in general women's groups, but want to be part of a group that focuses on career advancement and innovation within the context of their technical fields.

ERGs for women technologists – often named Women in Technology or WIT groups – range from volunteer-based, grassroots efforts to structured groups that enjoy substantial support from technology leaders or human resource teams. The structure is usually developed by the women to suit their interests. Some have monthly or quarterly meetings featuring internal and external speakers. Others have a wider array of activities that may include events and training workshops as well.

While such communities need few resources, organizational or executive sponsorship can help establish these important communities. For example, NetApp's Women in Technology community was launched with the support of the CTO in 2009 and has scaled to 10 sites in 3 countries; leaders report back on ideas generated by the group, helping increase the impact of women on technology at the company. Intel developed a community for women principal engineers and fellows that helps women advance in the technical path through skill development, mentoring and opportunities to present ideas.

A well-designed technical women's network can:

- Reduce feelings of isolation
- Establish internal networks of support
- Provide role models for advancement
- Advance technical knowledge and skills
- Encourage mentoring and sponsorship relationships
- Demonstrate company commitment to women technologists
- Foster internal dialogue on the specific needs of women technologists
- Cultivate innovation across group boundaries
- Inform the company's broader diversity strategy

Building Community in the Technical Pipeline: Intel's Women Principal Engineer and Fellows Forum

In 2006, Intel launched the Intel Womens PE and Fellows Forum (WPEFF), designed for female principal engineers, Fellows and those likely to be promoted to principal engineer (PE). The forum is modeled after the Intel Fellows Forum which was predominately male with only a handful of female attendees, leaving senior women technologists with little opportunity to publically present their work and network with Fellows and influential technical leaders. As a result, the WPEFF was created to provide an environment for women in technology roles to connect and offer peer coaching and mentoring to help women improve their technical work, test ideas, and gain experience presenting before a highly technical audience. Every invited principal engineer and Fellow is asked to bring a guest of their choice, typically a woman they are currently mentoring or who they feel is an up-and-coming technical leader. The WPEFF was highlighted in *Harvard Business Review's* "The Athena Factor" report as a likely game-changing initiative that will allow many more women to stay on track in science, engineering and technology careers. Currently WPEFF meets annually, but in 2014 Intel plans to increase the meeting frequency to quarterly.

Key Elements for Success:

- The program brings together women Fellows and PEs with those women likely to be promoted to PE as an opportunity to improve their technical skills.
- Technical females and Human Resources (HR) collaborated to develop a program that meets the evolving needs of Intel's technical females and engage them with male peers and executives.
- The event features external speakers, peer coaching and workshops focused on solving technical issues.
- Women have the opportunity to receive feedback on new ideas they present, providing a safe arena to practice presenting and receive critical feedback from peers, mentors and experts.
- The event provides networking opportunities with potential future stakeholders and peers at other campuses and in business units.
- Attendees receive encouragement to stay on the technical path and make contacts that will assist in career growth and continued development.

Outcomes:

- Since the program started, three women have become Intel Fellows and the number of female principal engineers has increased by approximately 20%.
- More than 100 of Intel's senior women technologists from the U.S., India, China and Malaysia have attended WPEFF.
- About 50% are already PEs, Senior PEs or Fellows; others are being encouraged to remain on the technical track.
- 12% are managers and 88% are individual contributors.
- The forum environment fosters cross-organizational relationships, which helps the company address technical issues and adds value.
- The goal of this event is to help increase the number of female technical leaders:
- Intel started with 38 PEs in 2006 and grew to having 55 PEs in 2013.
- Intel started with zero Fellows in 2006 and grew to having three Fellows in 2013.

ORGANIZATIONAL INFRASTRUCTURE AND POLICIES

"Women now outnumber men in managerial and professional jobs, yet many leave even blue-chip employers because they do not feel valued, their companies do not offer flexible-employment policies, or their work is not intellectually challenging. Rather than leave the workforce, most resurface at companies that offer more progressive policies."

WAYNE F. CASCIO, "THE ECONOMIC IMPACT OF EMPLOYER BEHAVIOR ON ORGANIZATIONAL PERFORMANCE," 2006[52]

How companies can make systemic changes that increase the retention of women in technical roles

A desire for more work-life balance is consistently among the top three reasons to leave a company.[53] The impact of work-life conflict has been shown to have pervasive negative consequences that impact not only retention, but also employee productivity and engagement.

While managing work-life integration is an issue for both men and women, women often bear the brunt of family care. Work-life tension for women becomes more pronounced as they establish families or care for elderly parents. In a study of women engineers, those who left the field (mostly to other careers) cited a desire to have more time with their families as the most frequent reason for leaving. For existing female engineers, those who face excessive workloads feel significantly less satisfied with their jobs and are more likely to leave.[54] Work-life fit is not limited to family responsibilities; research shows that work conflicts with other personal priorities such as time with friends, health and exercise, pursuing hobbies and interests, or volunteering in the community, and this has a significant impact on job satisfaction.[55]

Recommendation 9. Institute flexible work arrangements and tools that facilitate work-life integration.

Providing flexible work hours and options for telecommuting and part-time work arrangements can help all employees, both men and women, achieve better work-life integration. It's not unusual for an employee of a Silicon Valley technology firm to collaborate with colleagues in Europe early in the morning and colleagues in Asia well into the evening. It makes sense for employees to flexibly adapt their schedules and locations with the demands of their work and life so they can maximize their work productivity while meeting the demands of their personal life. When flexibility becomes the norm, women are less likely to experience a "flexibility stigma," which has been shown to negatively affect women's careers.[56] While flexible schedules are critical as a retention tool, companies should be cautious that flexibility options are not used to mask excessive workloads.

Telecommuting: A meta-analysis of 46 studies on telecommuting shows that telecommuting increases perceived work control, decreases work-family conflict, decreases role stress, increases job satisfaction, and reduces turnover intentions. The study also showed a positive effect on supervisor-employee relationships and enhanced supervisor ratings. The analysis identified no adverse effects on career mobility. The benefits were stronger for women, as they traditionally experience more work-life conflict.[57]

Some level of flexibility and telecommuting options has increasingly become the norm. According to the 2012 Fortune Best Company to Work For survey, employees at many companies are able to telecommute regularly at least part of the time.[58] While the benefits are widespread, research shows that employee relationships can suffer and isolation may increase for those who telecommute most or all of their work time.[59]

The availability of flexibility policies is critical to the retention of women technologists. Companies should not only implement such policies but ensure they are supported effectively, deployed for both men and women, and modeled at the top. Best-practice programs incorporate informal and formal communication mechanisms (online collaboration tools are an example) and include structured face-to-face communication to foster knowledge exchange and innovation. Companies should develop appropriate management mechanisms and accountability structures to reap the productivity benefits of flexibility practices.

Part-Time Work: Providing employees, both women and men, with the option to work part-time with commensurate pay and responsibilities, can be an effective solution

to retain talent. To be successful, however, part-time policies should align with a company's culture and work structure. Not all positions are suitable to part-time arrangements; setting clear expectations around deliverables, work time, availability and communication is important. Evaluation criteria should be adjusted and clearly articulated so part-time workers are not penalized in comparison to full-time employees. Career development and advancement opportunities are just as important to part-time employees. Managers should help those who take advantage of part-time options with their career planning.

Recommendation 10. Enact employee leave policies and provide services that support work-life integration.

Many companies offer an array of new benefits and services that help all employees – men and women, technical or nontechnical – integrate work and life. The presence of such policies not only helps retention but is often a selling point for recruitment.

Employee Leave: Many companies offer some level of paid leave to support new parents. Some have adopted a standard of 12 paid weeks of leave for mothers and, increasingly, companies are offering short periods of paid leave for fathers and domestic partners. Google extended its paid leave to 18 weeks finding that granting new mothers a longer period of paid leave and providing on-ramping support for their return is less costly than turnover and replacement expenses.

Sabbaticals, offered by some companies, vary widely in implementation and have been found to be important retention strategies for technical employees.[60] For example, Intel offers an eight-week sabbatical with full pay earned every seven years.

Both managers and employees have concerns to address when considering taking a leave of absence. For managers, continuity of work is important. Employees worry that they may fall behind in their career paths. Seventy-three percent of women trying to return to the workforce after a voluntary timeout for childcare or other reasons have trouble finding a job.[61] Leave policies should incorporate appropriate lead times to transition work to others. Once the leave is over, similarly well-planned on-ramps can facilitate re-entry—this is particularly important for extended leaves.

Family Services: Many technology companies now provide on-site childcare or childcare referral services, elder care referral services, and other support for dependent care such as emergency childcare or adoption assistance programs. Nearly a third of Fortune's 2012 Best Companies to Work For offer on-site childcare. Such programs not only improve retention but also increase the desirability of the company as a potential employer for prospective candidates.[62] Few companies currently offer eldercare assistance. With a growing number of employees having eldercare responsibilities—17% of the workforce at any given time and 42% of the workforce over a period of five years across gender,[63] there will be a greater demand for these benefits in the future.

Google's Extended Family Leave Policy

When Google took a look at its maternity and family leave policies back in 2007, it found that although Google offered an industry-standard maternity leave plan, it was not on par with its other well-respected people policies. At the time, moms in California received 12 weeks of paid time off after giving birth, while all other new parents in the U.S. received seven paid weeks of leave.

Google wanted to make sure that it was doing the right thing for existing and potential Googler moms, so in 2007, made changes to maternity leave and parenting programs to better support mothers. Google developed an extended family leave policy in which it increased paid maternity from 12 to 18 weeks. Google also set up forums for parents to connect and exchange information about parenthood. These include a Mommy Mentor program, a New Parents support group, and similar groups that have extended across all its U.S. and global campuses.

Google has continued to extend and develop these benefits, and now offers an Expectant and New Parent Gurus (ENP) program. ENP Gurus are experienced and respected Googlers who offer 1:1 career conversations focused on adapting to the new role as a working parent.

Key Elements for Success:

- The policy changes and program development were driven by a recognition that becoming a parent in a fast-paced work environment leads to work-life tensions that affect women especially.
- The policy recognizes that babies are at a significantly different development phase at 4.5 months compared to 3 months.
- The policy provides critical flexibility to facilitate on-ramping: After an initial three months of leave, mothers have options on how and when to use the remaining two months of leave, whether by working part time or taking the remaining time at a later date.
- The program is not just for women; Google offers seven weeks of paid leave for fathers, domestic partners, and adoptive parents.
- The policy is augmented by Mommy Mentoring, a program in which new mothers are paired with more experienced Googlers in combining work and parenting during their return on-ramping.
- Google complements the policy with an Expectant and New Parent support group, to promote work-life mentoring for all new parents.

Outcomes:

- Over 90% of Google's new moms participate in the program and take advantage of the maternity benefits.
- Technical women comprise about 50% of the participants in the Mommy Mentoring program.
- Googlers' overall job satisfaction increased after the policy went into effect.
- The new leave policy is cost-effective; granting mothers five months of leave costs less than recruitment costs to replace losses, and it has given Google a competitive advantage in recruiting women.

CONCLUSION

The research-based recommendations in this paper outline critical elements of a retention strategy. Implementing programs and practices based on these recommendations sends a clear signal that an organization supports women technologists in meaningful ways. A large-scale study of women in engineering careers shows that women who work in companies that support their development, help them manage work-life integration, and value their contributions are most satisfied with their jobs and less likely to leave the company.[64] This perceived support has the power to mitigate the effects of a poor manager, a difficult microclimate, or the disruption associated with organizational change.[65]

There are many paths to the successful implementation of retention practices. Leaders and managers embarking on a focused effort to retain their women technologists should first and foremost develop a coherent, data-driven strategy that meets the challenges and needs of their companies. Leaders should establish and understand baseline data so that they can prioritize their investment of time and resources and address both short-term and long-term goals.

Companies should carefully consider several aspects of retention initiatives as they design and add new components. Over time, each company should build its own portfolio of initiatives that address accountability, culture, community, and policy. As they adopt and adapt our recommendations, companies should consider which programs are best designed to address challenges specific to women technologists and which can be deployed to benefit all employees. The most successful programs are often collaborations among leaders, managers, women technologists and inclusion professionals. Finally, it can pay off to pilot programs, starting small to evolve the right model, test effectiveness, and build support that can then be scaled across campuses and geographies.

There is no one-size-fits-all solution to keeping women technologists in the pipeline; however, there are practices that, combined with appropriate leadership support, have been shown to improve retention. Shaped by their size, culture, and workforce composition, companies are forging many different paths to implementing successful retention practices and experimenting with new models. What they all have in common is company leadership that is committed to building the best, most innovative teams possible.

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