



MICHELLE R. CLAYMAN INSTITUTE
for GENDER RESEARCH
STANFORD UNIVERSITY



ANITA BORG INSTITUTE
FOR WOMEN AND TECHNOLOGY

CLIMBING THE TECHNICAL LADDER: OBSTACLES AND SOLUTIONS FOR MID-LEVEL WOMEN IN TECHNOLOGY



CAROLINE SIMARD, PH.D. AND ANDREA DAVIES HENDERSON, PH.D.

SHANNON K. GILMARTIN, PH.D. | LONDA SCHIEBINGER, PH.D. | TELLE WHITNEY, PH.D.

Underwriters

RESEARCH UNDERWRITERS

National Science Foundation grant #0413538
through the National Center for Women and
Information Technology

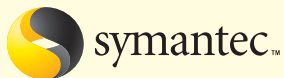


Career Action Center

Anita Borg Institute for Women and Technology
Michelle R. Clayman Institute for Gender Research,
Stanford University. At the Clayman Institute, this study
was made possible by the generous support of Michelle
R. Clayman, Margaret Earl Cooper, Vicki Bever Cox, the
Sakurako and William Fisher Family Foundation, Beth
Garfield, Nicholas and Mary Graves, Lorraine Hariton and
Stephen Weyl, Susan Heck, Leslie and George Hume, and
Stephen and Lisa Nesbitt.

REPORT UNDERWRITERS

Contributing underwriters



Michelle R. Clayman Institute for Gender Research,
Stanford University
Anita Borg Institute for Women and Technology

Supporters



Alexander Atkins Design, Inc.
Ventana Public Relations
Jody Mahoney

About the Authors

Caroline Simard, Ph.D., is Director of Research at the
Anita Borg Institute for Women and Technology.

Andrea Davies Henderson, Ph.D., is Research Director
at the Michelle R. Clayman Institute for Gender Research at
Stanford University.

Shannon K. Gilmartin, Ph.D., Director of SKG Analysis,
is a quantitative analyst and research consultant for the Anita
Borg Institute and the Michelle R. Clayman Institute for
Gender Research at Stanford University.

Londa Schiebinger, Ph.D., is the John L. Hinds Professor
of History of Science and Barbara D. Finberg Director of
the Michelle R. Clayman Institute for Gender Research at
Stanford University.

Telle Whitney, Ph.D., is CEO and President of the Anita
Borg Institute for Women and Technology.

ACKNOWLEDGMENTS

Sincere thanks to the seven companies that participated in this study. These leading high-tech companies demonstrate significant commitment to the retention and advancement of technical women through their involvement. A special thanks to company representatives, who helped launch the survey within their companies. Thanks to the technical men and women who took the time to complete the survey and participate in interviews.

We thank our highly talented research team: Elizabeth Bandy, Ph.D.; Manwai C. Ku, Ph.D. candidate; Justine E. Tinkler, Ph.D.; and Weiwei Shen, Ph.D. candidate. We are also grateful to Janice Stockard, Ph.D.; Nancy Ramsey; and Pamela McCorduck for pre-study research.

Special thanks to the following at the Anita Borg Institute: Cindy Goral, VP of Operations; Jerri Barrett, Director of Marketing; Jody Mahoney, VP of Business Development; Alexandra Krasne, Development Manager. At the Clayman Institute: Michelle Cale, Associate Director.

A special thanks to our Stanford Faculty Advisors: Debra Meyerson, Associate Professor of Education and, by courtesy, in the Graduate School of Business; Sheri Sheppard, Professor of Mechanical Engineering; Shelley Correll, Associate Professor of Sociology.

We appreciate the Anita Borg Institute Board of Advisors for its valuable comments and the National Center for Women and IT Workforce Alliance for early feedback on the study design and preliminary results.



Executive Summary	4
Chapter 1: A Portrait of the Technical Workforce	13
This chapter presents a demographic profile of all surveyed technical employees. It then delves into the specific attributes of mid-level technical women.	
Chapter 2: Family	25
The majority of mid-level men and women have young children at home. Work-family issues are pressing for mid-level technical women because they are more likely than men to be in dual-career households. We also explore the prevalence of dual-career “technical” couples (where both partners work in the high-tech industry).	
Chapter 3: Perceptions of Success and Core Work Values at the Mid Level	33
What do technical workers value? How do they envision success? This chapter reports data-driven metrics on technical men and women’s core work values and perceptions of success.	
Chapter 4: Workplace Culture and Climate	45
Workplace culture plays a critical role in the retention and advancement of mid-level women. We use survey data to create a robust profile of today’s high-tech workplace culture.	
Chapter 5: Retaining and Advancing Mid-Level Technical Women	59
What company policies are most important to technical men and women? This chapter analyzes company policies that mid-level technical women identify as most important to their careers and how well companies deliver on these policies.	
Appendices	69
Endnotes	75

Executive Summary

The mid level is perhaps the most critical juncture for women on the technical career ladder because it is where a complex set of gender barriers converge.

Leading high-tech companies require diversity to maintain globally competitive technical workforces. Research shows that workforce diversity can boost a company's bottom line by providing creative variety of thinking styles and, thus, new business solutions. A recent industry report by Gartner estimates that by the year 2012, teams with greater gender diversity (when compared to all-male teams) will be twice as likely to exceed performance expectations.¹ Gender diversity in the high-tech workforce fuels problem solving and innovation – the driving force of technology.²

But when it comes to providing opportunities for technical women, high-tech firms lag sharply behind those in other sectors. As this report shows, men are significantly more likely than women to hold high level management or executive positions. Women at the mid level of their high-tech careers are extremely valuable to companies, but this seems to be the very point at which they face the greatest barriers to advancement — at a cost to both the companies and the individual women.

In order to learn why the mid level is a “glass ceiling” for women on the technical ladder, the Anita Borg Institute for Women and Technology and the Michelle R. Clayman Institute for Gender Research at Stanford University have undertaken a groundbreaking study of female scientists and engineers at seven mid to large, publicly traded Silicon Valley high-tech firms. Drawing from a large-scale survey and in-depth interviews conducted in 2007 and 2008, this report proposes data-driven, systematic solutions for the retention and advancement of technical women.

Key Questions

- Who are mid-level technical women?
- What are the barriers to their retention and advancement?
- How can companies secure their investments by ensuring that female technical talent reaches high-level positions?

Key Findings

The technical workforce

- Technical men are more likely than technical women to hold high-level positions. In our sample, the odds of being in a high-level position are 2.7 times as great for men as for women. Women comprise an increasingly smaller proportion of the workforce at each successive level (from entry to mid to high).
- Mid-level women are predominantly white or Asian. There are few underrepresented minority women at this rank.
- Technical women, like technical men, are highly educated. Among mid-level employees, the majority of men and women have technical degrees in computer science or engineering. However, rates of technical degrees are higher among men than among women (77.1% versus 61.2%).

The workplace experience

- Women are more likely than men to perceive workplace culture as competitive. They do not see their workplaces as true meritocracies; rather, they see cultures that require connections to power and influence in order to advance.
- Consistent with prevailing gender stereotypes about women's abilities, women in management positions are perceived as less technically competent than are their male counterparts. This can create an environment where women are viewed (and can view themselves) as “not fitting in” with the company culture.
- Mid-level women are more likely than men to believe that extended work days are required for success. If the majority of women believe this to be the case, those who cannot work late on a regular basis may perceive barriers to their advancement.
- Mid-level men *and* women agree that mentoring is important to long-term career development, but is not rewarded by high-tech companies. This acts as a further potential barrier to women's advancement.
- Survey results show that mid-level men *and* women strongly value teamwork. Further, men and women perceive that collaboration is key to success in technology. However, mid-level women see a sharp divide between

cooperation and competition at their companies. Mid-level women describe this gap as being especially acute during the promotion-review process, where they find existing promotion and evaluation practices reward competition instead of collaboration.

- Mid-level technical men *and* women value having an impact on their team, their organization, and on technology users.

Work and family

- The majority of mid-level men *and* women describe themselves as family-oriented. However, both men and women believe that being family-oriented is not associated with success in technology. Many mid-level women whom we interviewed described a “family penalty.” And many men also experience family responsibilities as a potential roadblock to advancement.
- Employee advancement in today’s high-tech workplace culture can come at the cost of family and health.
 - Mid-level women are more likely than mid-level men to suffer poor health as a result of work demands.
 - Mid-level women are almost twice as likely as men to report delaying having children in order to achieve career goals.
 - Mid-level women are more than twice as likely as men to report foregoing having children in order to achieve career goals.
 - Mid-level women are more likely than men to report foregoing having a marriage/partnership in order to achieve career goals.
- While the majority of mid-level men and women who are parents have young children at home, important gender differences remain. Among mid-level technical employees who are married/partnered:
 - Mid-level women are more than twice as likely as men to have a partner who works full time.
 - Mid-level men are almost four times more likely than women to have a partner who assumes the primary responsibility for the household/children.
 - Among those with working partners, the majority of women report that their partners work in high tech.

Recommendations

All recommendations are based on survey and in-depth interview data. Please see the end of each chapter for a complete list of report recommendations.

Professional Development

Investing in professional development is the most profitable step high-tech companies can take to advance technical women and retain all technical talent. Survey results show that technical men and women value opportunities to update their technical skills and technical professional development above and beyond other work benefits. In addition, technical development programs will provide networking benefits to further propel technical women’s advancement.

- 1) **Create company-wide opportunities for all technical employees – at all rank levels – to participate in technical professional development, on company time. Send a signal to employees that company investment in their technical human capital is a priority. Workflow must be adjusted accordingly, as mid-level workers cite a lack of time due to work responsibilities as the number one barrier to updating technical skills. High-tech companies should train managers on this topic and provide appropriate budgets for such development. Managers must ensure that all technical employees have access to appropriate opportunities.**
- 2) **Create opportunities for technical employees to participate in leadership and management development on company time. Survey results show that technical women value opportunities for professional development of leadership and management skills. In addition to a core investment in their technical professional development, high-tech companies can improve technical women’s advancement by investing in their career development.**

Fostering a Positive Work Culture

Survey results indicate that mid-level men and women experience workplace culture differently. For mid-level women, high-tech culture is competitive and unfriendly — one that requires significant personal sacrifice as well as concerted effort to be assertive in order to be heard. High-tech company leaders should carefully consider how their company culture may be hindering diversity at the “micro level” of departments and workgroups.

- 1) Create company awareness about diversity in communication styles. Technical employees agree that being assertive is essential to success. However, assertiveness can stifle different communication styles, pushing women and men into a single communication mode that further exacerbates gender stereotypes. This may also negatively impact ethnic diversity, as some cultures emphasize listening and humility rather than assertiveness. High-tech companies should ensure that a variety of communication styles are represented in the executive ranks in order to foster company-wide communication diversity.
- 2) Make mentoring matter in order to give mid-level technical women seamless, internal support for their professional development. Create a mentoring culture by adding mentoring to your company’s evaluation and promotion policies. This will encourage women and men – at all rank levels – to participate in mentoring activities. High-tech executives must participate, whether or not your company has a formal mentoring program. No mentoring program will be successful as long as it is perceived as being one of your company’s least rewarded behaviors.

Flexibility, Work Pace, and Family

Our study results clearly show that the majority of mid-level technical men and women are “family oriented” and perceive high-tech culture as contradicting their own family values. However, Silicon Valley’s mid-level technical women differ from their male peers in important ways. Mid-level technical men are much more likely than women to benefit from partners who do not work full-time and take care of household responsibilities. This fuels inequality regarding work-life pressure at high-tech companies.

- 1) Mid-level women want flex time. They are more likely than men to rank flexibility as an important benefit. High-tech companies should continue to offer flexibility as a work benefit, expanding this definition to include options for part-time schedules, flexible schedules, and telecommuting. Flexible scheduling is essential for retaining mid-level women, who often face unique work/life challenges. High-tech companies need to foster workplace cultures that encourage women and men to take advantage of flexible schedules.

Managers and Executives

When it comes to retaining and advancing mid-level technical women, high-tech companies must count on their managers to get the job done.

- 1) Train your managers to manage. Company evaluation and promotion policies for managers should require their general awareness of gender issues in the workplace. This brief training should highlight the barriers to advancement that technical women most often encounter, as well as the simple gestures that will create family-friendly workgroup environments. Then, reward managers for taking an interest in the long-term career aspirations and professional development of the technical women and men reporting to them. Overwhelmingly, the technical women whom we interviewed attributed their successes to having a manager “who got it.”

A Diverse Leadership Team

Technical employees can clearly see a company’s commitment to diversity by looking at top technical and executive ranks.

- 1) Diversify pathways for advancement to the highest ranks on the technical ladder. This will enable any technical women who have accumulated industry and company-specific technical expertise, without the benefit of holding technical degrees, to advance.
- 2) Increase women’s representation on your company’s Board of Directors. Diversity breeds diversity. A diverse leadership team is essential to fostering a culture that values diversity. One of the most powerful ways to improve retention and advancement rates for women is to promote women to senior technical positions.³

Introduction

Leading high-tech companies rely on diverse technical workforces that span the globe. Recruiting competition is fierce as the number of high-level technical jobs, such as software engineers, has been growing since 2000 and shows few signs of slowing down.⁴ In fact, the high-tech industry projects adding 1.6 million new jobs between 2002 and 2012.⁵ Employment for computer software engineers alone is projected to increase by 38 percent over the period from 2006 to 2016.⁶ Workforce demands are high due to two supply-side factors: 1) decreasing numbers of computer science graduates in the U.S. 2) impending retirements among baby-boomers.

Technology business leaders agree focusing diversity efforts on recruitment alone is not enough. In a recent survey, 300 technology executives identified hiring and retaining skilled technical workers as their top concern.⁷ Today's technical employees hail from diverse backgrounds, making retention difficult for companies that cannot meet diverse needs. Poor retention rates, in turn, add an additional costly burden to recruiting efforts. The cost of filling the vacancy left by a single skilled technical employee is estimated to be as high as 120 percent of the yearly salary attached to that position.⁸

A diverse global workforce brings new benefits to high-tech companies. Group diversity leads to better decision outcomes which are borne out in a variety of settings, occupations, and organizations.⁹ Diversity also improves group task performance on creativity and innovation.¹⁰ In short, research shows that workforce diversity boosts a company's bottom line because a variety of opinions, backgrounds, and thinking styles stimulate new business solutions.

Gender diversity, in particular, is a benchmark for high-tech success. A recent industry report by Gartner estimates that by the year 2012, teams with gender diversity (when compared to all-male teams) will be twice as likely to exceed performance expectations.¹¹ Gender diversity in the high-tech workforce fuels problem solving and innovation — the driving force of technology.¹²

As most executives at high-tech companies recognize, they have a vested interest in retaining and promoting technical women after investing valuable resources in their training. Yet gender disparity in the technical workforce remains glaring: few women reach top-level positions, such as Technology Fellow or VP of Engineering. Why this is so plays out at the mid-level. **The mid-career level is perhaps the most critical juncture for women on the technical ladder because it is here that a complex set of gender barriers converge.** And the problems involved go far beyond work and family issues. They are rooted in outmoded workplace practices and cultures that do not take into account the needs of an increasingly diverse workforce.

Why Technical Women?

The computer and information technology industry is seen as a place where innovative thinking generates breakthrough new technologies and lucrative products. Yet when it comes to providing opportunities for women, research suggests that high-tech firms lag sharply behind those in other sectors. Women make up only 25.6 percent of U.S. computer and math occupations.¹³ They constitute only 8 percent of engineering managers.¹⁴ In addition, recent statistics show that women make up a modest 13 percent of the boards of directors at high-tech Fortune 500 companies, compared to 14.8 percent among all Fortune 500 companies.¹⁵

The underrepresentation of women in the science, technology, engineering, and mathematics (STEM) workforce has long been of concern to policy makers, academics, and industry leaders alike.¹⁶ This concern is only intensifying with the looming shortage of U.S. STEM human capital. Many concur that any drop in the U.S.-generated STEM workforce would undermine national competitiveness.¹⁷

A nation at risk

“The women that I’ve worked with have been as good as or better than the men. Maybe they had to be. I would like to see that problem solved. I think that our technological leadership as a nation is very much at risk — if we can’t expand beyond white males, we’re in real trouble.”

– mid-level technical man, with 30 years of experience

Despite this national concern, we lack meaningful data on the key factors driving retention rates for technical women.¹⁸ Most studies focus on women at the highest ranks, where research shows that they hold only 3 percent to 5 percent of senior roles in technology.¹⁹ Surprisingly, we know little about how women climb the technical ladder.^{20,21}

Why Mid-level?

Mid-level is a critical juncture for both women on the technical ladder and the high-tech firms in which they are employed. Women arguably face the greatest barriers to advancement at mid-level, a point when the loss of their technical talent is most costly to high-tech companies. A recent report identifies the midpoint of women’s science and technology careers as the optimal time for high-tech companies to bolster their retention efforts. The authors dub this midpoint the “fight or flight moment,” given that 56 percent of women in high-tech companies leave their organizations at this point.²²

In order to learn why the mid-level is a “glass ceiling” for women on the technical ladder, the Anita Borg Institute for Women and Technology and the Michelle R. Clayman Institute for Gender Research at Stanford University have undertaken a groundbreaking study of women scientists and engineers at seven mid to large, publicly traded Silicon Valley high-tech firms. Drawing from a large-scale survey and in-depth interviews conducted in 2007 and 2008, we analyze new data on women working at the mid-level. In this report, we share the results of our study and propose data-driven, systematic solutions for the retention and advancement of technical women.

“Climbing the Technical Ladder: Obstacles and Solutions for Mid-Level Women in Technology” uncovers important barriers to the advancement of women. Our report hones in on this critical career juncture by answering the following key questions:

- Who are mid-level technical women?
- What are the barriers to their retention and advancement?
- How can companies secure their investments by ensuring that female technical talent reaches high-level positions?

What is mid-level?

Studies of technical careers in various industries have identified four basic career stages, ranging from apprentice to executive.²³ These four stages are corroborated by studies of R&D organizations that define a dual-ladder career structure (technical versus managerial) consisting of four to five steps.²⁴ In this report, we define mid-level as those positions considered “second career stage” by the high-tech companies in our study. Mid-level personnel are typically technical employees with considerable work experience, but who have not yet reached senior leadership positions.²⁵

In this study, we worked with participating companies to define career stages as entry, mid, and high levels. Companies were asked to provide general information about their respective career ladders or structures. Using this information and respondents’ self-reported title, level, and/or rank, we developed a level scheme within which respondents were classified as entry, mid, or high, and as an individual contributor or manager, according to their respective company rubric.

We found that mean years of experience among entry-level respondents ranged from a low of 4.4 at one company to 14.1 at one of the oldest companies, mean years of experience among mid-level respondents ranged from 9.4 to 19.5, and mean years of experience among high-level respondents ranged from 15.8 to 22.8. This mid-level range (9.4 to 19.5) is consistent with other “mid-career” definitions as being between 10 and 20 years of experience.²⁶

Previous Research on the Barriers to Women’s Advancement

Barriers to the advancement of women in the workplace are well documented in social science research. We review four critical barriers for women below.

Stereotyping

Stereotyping most often occurs when there is a clear “out-group” member, such as a single woman on a technical team of men. In this instance, the sole woman will be the subject of more stereotyping than any of the male team members.²⁷ This type of stereotyping is known as “tokenism” because one person clearly belongs to a minority group.²⁸ Tokenism means that the majority (male) group members treat their female coworker as someone who represents all the stereotypical characteristics of women in general. This scrutiny is palpable to the technical woman, who sees her performance and communication style judged differently from that of her male peers. For example, cultural attitudes that reward men who act assertively simultaneously punish women who exhibit similar behaviors.²⁹ This has real career consequences. Moreover, women are stereotyped as “family focused” and “unwilling to travel,” and are more likely than men to be passed over for promotions.³⁰ Women who have “out-group” status are also more likely to be pushed toward tasks that are stereotypically feminine, such as support work.³¹ This results in further stereotyping as evidenced by the devaluation of “soft skills” on the technical track.³² Stereotyping intensifies for women from underrepresented racial or ethnic minority groups. The end result for many “out-group” members is that they are more likely to leave their companies.³³

Exclusion from social networks, lack of role models and mentors

Network ties build social capital and are key to career opportunities and advancement.³⁴ This is true in high-tech industry, where research shows that senior managers with more social capital (in the form of network ties that bridge different groups) are more likely to get promoted.³⁵ Women in lower positions on the technical ladder (from entry- to mid-level) have fewer opportunities to network outside their immediate department.³⁶ Due to their minority status in the high-tech workplace, women require broader networks for career advancement. This means that many successful women must find alternative network routes to the top.³⁷ Research on one large IT firm reveals that women have to use networks differently than men in order to achieve the same promotion and overall career benefits. Researchers found that women benefit from having ties to colleagues who have both wide networks and strategic placement within the company hierarchy.³⁸ Role models and mentors also play a critical role in women's career success. However, research shows that women in technology are likely to suffer from a lack of mentors and role models.³⁹

Work-life balance

Technology, as a culture, is often associated with masculine traits. Research shows that technology work culture at its core is masculine, white, and heterosexual, associated with hard programming, obsessive behavior, and extensive working hours.⁴⁰ In high-tech companies, "flexibility" often means staying until midnight coupled with the expectation of increased productivity and constant availability. Those with children face the unvarying expectations of a 24/7 workload. The high-tech work pace is so extreme that academic researchers refer to it as a work-family "conflict" rather than work-family balance. Work-family conflict hits women at the mid-level especially hard.⁴¹ When the demands of family life are irreconcilable with work responsibilities, women are often forced to choose between work and family in this "all or nothing" proposition. Career mothers are caught between two competing ideal-types of "mother and family" and "devoted worker."⁴² This dilemma is true even in times of economic prosperity.

Organizational structure

Organizational structures — from policies to practices — impact women's ability to attain leadership positions.⁴³ Many research studies document how workplaces that appear to be "gender-neutral" and meritocratic are, in fact, organized around men's work styles and life cycles.⁴⁴ Further, subtle gender bias in hiring, promotion, and evaluation practices (including salary levels) is common across organizations.⁴⁵ Companies engage in "homosocial reproduction." Underrepresented minorities and women are evaluated on criteria originally developed for "white upper-middle class men."⁴⁶ In fact, many companies rely on established rigid corporate practices for employee evaluation that fail to take diversity into account.⁴⁷ Hiring practices also tend to reproduce social inequality. When hiring, new positions and career titles are often created with one individual rather than a pool of individuals in mind. One researcher found that almost half (47%) of open positions at 415 companies had only one candidate.⁴⁸ In short, company practices and internal labor markets unwittingly reproduce social inequality within their organizations. This finding holds true for high-tech companies where evaluation practices are entwined with subtle gender bias, making it harder for women to prove their technical expertise.⁴⁹ Furthermore, research shows that women and underrepresented minorities find fewer career opportunities even after upgrading their skills.⁵⁰

Interpreting the data in this report: Who are our survey respondents?

Respondents to the “Climbing the Technical Ladder” survey include 1,795 technical men and women at seven high-technology companies in the Silicon Valley region (for a more detailed discussion of company recruitment, company and sample characteristics, and study methodology, see Appendix A). Participating companies identified and surveyed their core Silicon Valley technical workforce across all levels of the technical ladder. Among survey respondents, 55.5 percent were classified as mid-level according to each company’s organizational structure. An additional 19.9 percent of respondents were classified as high level, and 24.6 percent of respondents as entry level.

Key indicators suggest that our sample is representative of the Silicon Valley technical population more so than it is of the national or statewide technical populations (see Appendix A). Silicon Valley is one of the most globalized technical regions in the world. Thus, our sample is not simply a snapshot of a technical workforce, but of a highly global, competitive, and mobile technical workforce — a “valley workforce” that will increasingly characterize all parts of the world. Insights on retention and advancement in such a mobile and competitive workforce are especially powerful for today’s high-tech companies.

Notably, at 34.2 percent of all survey respondents, women comprise a greater proportion of the sample than national and “valley-workforce” estimates of women in science and engineering occupations would lead us to expect. In this report, we conduct nearly all key analyses for technical men and women separately.

Unless otherwise noted, all between-group differences discussed in this report are statistically significant at the $p < .05$ level.

