

RETAINING WOMEN IN TECH

Shifting the Paradigm

Karen Holtzblatt
Nicola Marsden

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Retaining Women in Tech

Shifting the Paradigm

Synthesis Lectures on Professionalism and Career Advancement for Scientists and Engineers

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Karen Holtzblatt and Nicola Marsden

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Retaining Women in Tech

Shifting the Paradigm

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*SYNTHESIS LECTURES ON PROFESSIONALISM AND CAREER
ADVANCEMENT FOR SCIENTISTS AND ENGINEERS #6*



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ABSTRACT

For over 40 years, the tech industry has been working to attract more women. Yet, women continue to be underrepresented in technology jobs compared to other professions. Worse, once hired, women leave the field mid-career twice as often as men. In 2013, Karen Holtzblatt launched The Women in Tech Retention Project at WITops.org, dedicated to understanding what helps women in tech thrive. In 2014, Nicola Marsden joined the effort, bringing her extensive knowledge and research on gender and bias for women in tech. Together with worldwide volunteers, this research identified what helps women thrive and practical interventions to improve women's experience at work.

In this book, we share women's stories, our research, relevant literature, and our perspective on making change to help retain women. All the research and solutions we share are based on deep research and user-centered ideation techniques. [Part I](#) describes the @Work Experience Framework and the six key factors that help women thrive: a dynamic valuing team; stimulating projects; the push into challenges with support; local role models; nonjudgmental flexibility to manage home/work balance; and developing personal power. Employees thinking of leaving their job have significantly lower scores on these factors showing their importance for retention.

[Part II](#) describes tested interventions that redesign work practices to better support women, diverse teams, and all team members. We chose these interventions guided by data from over 1,000 people from multiple genders, ethnicities, family situations, and countries. Interventions target key processes in tech: onboarding new hires; group critique meetings; and Scrum. Interventions also address managing interpersonal dynamics to increase valuing and decrease devaluing behaviors and techniques for teams to define, monitor, and continuously improve their culture. We conclude by describing our principles for redesigning processes with an eye toward issues important to women and diverse teams.

KEYWORDS

gender, diversity, inclusion, design, software development, human-computer interaction, organization, team, stereotypes, bias, practices

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Introduction

Technology companies¹ are reshaping the experience of every person on the planet. Their impact is well beyond product development. We do not know where this journey will take us, but we do know that women are grossly underrepresented in shaping the outcome. Companies do not exclude women intentionally. Quite the contrary—tech companies are making great efforts to hire women. Still, they struggle to achieve anywhere near 50% women in their workforce or leadership. As a result, women are not participating effectively in reshaping the future of the human experience. We simply must do better.

We are writing this book for those who want to make sure that women get equal representation in shaping the world of tomorrow. We are writing for those who want to create organizations and teams that are welcoming to everyone. We are writing for those who realize that for all our efforts to bring women into tech, the existing work environment drives them away. Women love tech work, but still, they leave the field at an alarming rate.

*Women love tech work,
but they are leaving the
field*

We are writing this book to share what we have learned about what it takes to retain women in tech. We invite you to use our perspective and suggestions to try new things in your organization. Whether you are an engineer or user experience professional, a team lead or manager, an academic or administrator, a VP or director, or a human resources professional, internal coach, or consultant, you can help improve the way your diverse teams work. This book focuses on women in tech. Women are our largest underrepresented group in tech. And although we did not study other underrepresented groups explicitly, you may find ideas that may apply to them as well.

THE LACK OF WOMEN IN THE TECHNOLOGY INDUSTRY

Increasing the number of women in the technology industry is a high priority—and a longstanding problem. Huge investments are being made and have been made to increase women's enrollment in college science, technology, engineering, and mathematics (STEM) programs, to improve hiring practices, and to tackle workplace issues. Yet positions go unfilled.^[56, 93] Companies are failing to find and retain women and other underrepresented populations in technology positions.^[78] Moreover, this is not a Silicon Valley problem. Women are glaringly absent from tech jobs worldwide.

¹ We use the term “technology companies” to refer to software companies producing products, websites, social media, apps, and services. This includes IT groups within businesses supporting business processes and websites. We also include technology teams producing user-facing software in hardware products and vehicles. Last, we use the term “product” to refer to anything technology professionals create in these companies.

Women in tech represent only 25% of the technology workforce in North America,^[48] 18% in the EU^[24], and 15% in Australia.^[51]

Despite significant efforts by companies, women continue to be underrepresented in technology companies as compared to in the overall workforce.^[54] Starting in the 1960s and 1970s, the second wave of the women's movement led to increased participation by women in the workplace.^[77] Women fought to be educated and hired into professions that were atypical for their gender such as medicine, law, business, politics, and engineering. These “hero” professions,^[80] so-called because of their heavy workload and status, were not considered appropriate careers for women. But since the women's movement of the 1970s, women have successfully entered all these fields and more.^[17] Women may not represent 50% of all workers in traditionally male professions, but the growth is steady. Not so in technology.

Unfortunately, the number of women in tech increased until the 1980s but then flattened.^[7] Women's numbers then began dropping and have now stagnated at around 15–25%, depending on the country.^[41] Despite the herculean efforts of organizations like AnitaB.org and The National Center for Women & Information Technology (NCWIT) in the United States, or the Competence Center Technology, Diversity, Equal Opportunities in Germany (kompetenzz.de), as well as corporate programs to recruit women, women are not filling the ranks of technology companies.

THE LEAKY BUCKET: BEYOND FILLING THE PIPELINE

A long-standing explanation for the lack of women in tech has been the “pipeline” problem, that not enough qualified women are available to fill the positions.^[47, 61] Building the pipeline has long

Recruiting gets women in the door—but then 50% leave the tech field

been the focus of human resource offices' recruiting efforts^[33] and academic programs trying to produce more women to take the positions available.^[96] These recruiting efforts

are critical to growing the ranks of women in tech. A focus on attracting more women to tech has stimulated research and new practices. These include, for example, blind resume reviews and non-gendered job ads that do not use language that alienates women.^[29] These efforts work to get more women in the door to be interviewed. But what happens after they are hired?

Unfortunately, once hired, women are less likely to stay in the tech industry than men. The quit rate for women is 50% higher than the quit rate for men. Numerous studies show that women who enter the field leave more often than men.^[7, 28, 37, 67] The first 12 years in technology seem to be

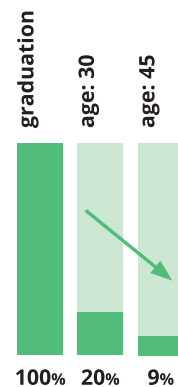


Figure 0.1: EU: Decline of women in tech^[44]

the most vulnerable: 50% of women leave the field for other occupations, compared to 20% of professional women leaving non-STEM fields.^[31] One sad statistic comes from the European Union (Figure 0.1): by the time they reach age 45, more than 90% of the women who graduated with a degree in information and communication technology have left the field.^[44]

While men also leave the field, the number of men staying is much higher.^[82] And men are more likely to turn over rather than to turn away; they take another tech job in a different firm rather than take a non-tech job.^[49] Our research indicates that 45% of women in tech are thinking of leaving their job. This data is telling. More is going on with the work experience of women in technology than can be solved by better recruiting.

We are reminded of a classic quality assurance story used to illustrate a mindset that blocks finding the root cause of problems in corporate processes.

Imagine a janitor mopping the floor. She notices that her bucket keeps running out of water. She returns to the faucet to fill it up again and again. She does not notice the trail of water behind her. She does not see the hole in the bottom of the bucket. She is focused on refilling her pail—not finding the root cause of his empty bucket.

Pipeline efforts are critical. But all these recruiting initiatives are for naught if women then leave the company or the industry. We need to turn our attention to the hole in the bucket, to the problem of retention.

While the numbers are disheartening given the effort to recruit women, the cost is material. Whether women leave to go to another company or abandon the field of technology altogether, companies are spending \$16B per year in employee replacement.^[78]

When women leave, companies lose the investment they made in employee training and support. But companies also lose potential women leaders. Companies are judged by women as good places to

A lack of women in tech impacts budget, brand, and recruiting efforts

work based on their overall number of women and percentage of women leaders. A lack of women in tech impacts cost, brand, and the ability to attract women. Worse, when women leave, it reduces the pool of potential women leaders available.

To achieve their stated goals, companies must focus on retention with the same energy, investment, and insight they have given to recruitment. But so far the issues of retention and advancement have been largely overlooked.^[27, 60] To start we must understand why women stay in or leave technology jobs—and then how to stem the tide.

WHY DIVERSITY MATTERS

Men dominate the technology industry. But why does it matter? Tech products create the future of how we live and work. Research has definitively shown that a diverse product team improves the quality of products, breadth of innovation, success of the organization, and bottom line.^[43] And

companies know it. Tech has long had a diverse workforce composed of people from different parts of the world, all of whom must work together. But if we want to expand the workforce and the creativity of our teams, we need to ensure that women and other underrepresented populations can participate successfully in diverse teams.

Research over the last few decades confirms that diverse teams create more innovative solutions for complex problems than teams composed of people with similar skills and backgrounds. In

A diverse product team produces more innovative products and increases profit

his work on diversity,^[70, 71] social scientist Scott Page has shown that groups with cognitive diversity consistently outperform groups selected based on a single criterion like the highest score on an aptitude test. His work and that of others^[43] have time and time again shown that innovation is fostered when people with different perspectives, knowledge, experience, skills, and backgrounds are brought together to solve complex problems.

Diversity within a team increases the breadth of its cognitive and behavioral repertoire. A review of research on team performance from 1960 onward also shows that teams of similar individuals deliver poorer performance when confronted with the level of complexity faced in technology companies.^[13] In addition, a homogeneous team, such as an all-male team of like-minded people with similar skills and backgrounds, is more likely to ignore the needs of underrepresented populations.^[10]

When women are added to the team, we also add their breadth of skills, ideas, and experience that comes from different life experiences. We enhance the chance that a superior solution will emerge and that the needs of women will be considered. So it is not surprising that diverse teams produce products that result in greater revenue and profit^[36] as well as patents.^[15, 88] And women CEOs also run more profitable companies.^[42]

But hiring practices work against building diverse teams. People are more comfortable hiring those who have similar ways of working and thinking and come from similar backgrounds as those

A “like-me” team assumes that everyone’s needs are like theirs, missing key design requirements

already on the team.^[50] We call this the like-me hiring phenomenon. As we have said, like-me teams decrease diversity in skill and experience and so too the potential for creativity. But worse, like-me teams increase the probability of engaging in what is called the fundamental design error.^[75] This occurs when teams define products through

introspection based on their personal experience and perception of how they imagine the product will be used. When teams design from personal experience and comfort, they tend to assume their own needs and wants are similar to what other people need and want.^[85] This is especially true in the absence of any rigorous data gathering from the target product populations.

When team members are similar to each other this natural human myopia is boosted. Homogeneous teams are more likely to agree and reinforce initial design ideas of what makes a good product concept.^[95] But if we put women and other underrepresented populations on the team,

we are less likely to make silly design choices and miss product opportunities altogether.^[94] For example:

- Apple's HealthKit, launched in 2014, tracked a wide range of metrics for personal health. For example, it tracked steps, stair climbing, cycling, or potassium intake. Apple claimed that it let users monitor all their most important metrics. But the product did not include a way to track women's menstrual cycles—a very important metric for 50% of the population!^[21]
- If a user tells Siri, Apple's private virtual assistant, that "Someone stole my computer," Siri not only understands the message but also walks the user through a process of what can be done. But if a user asks Siri about an issue more typical to women, "I've been beaten up by my husband," Siri points to a web page that says the husband most likely will do it again.^[57] Siri provides no help.
- Cell phones are designed for everyone, but they fit the average man's hand much better than women's hands. As Zeynep Tufekci, the author of *Twitter and Tear Gas*,^[91] noticed, she could not take photos above her head with one hand to document the use of tear gas—something she had seen men with larger hands do all the time.^[90]

Let's not even talk about the invention of the mammogram, which led feminist human-computer interaction (HCI) researchers to explore how a similar diagnostic system for testicular exams might be received.^[5] Like-me teams may think they are addressing the whole population, that they can design for everyone or for "one size fits all"; but they can't. When women are not on the team, their needs are too often not considered. As a result, products meant for everyone often fail to attract and support 50% of its target population.

What might our industry invent if we use the full potential of diversity? Companies know that to produce the most competitive and transformative products, they must form and successfully manage diverse teams. And they are spending lots of money and effort trying to make it happen. But do we really understand how to help diverse teams thrive? It's relatively easy to manage an organization when everyone is like me—not so when we are all different. With diverse teams, we have more than a project timeline or the best design to worry about. If we want the voices of women and other underrepresented populations to be heard, we must understand how to manage diverse people working together.

UNDERSTANDING RETENTION: IF GOING TO WORK ISN'T FUN, WHY DO IT?

We spend more of our waking hours at work than anywhere else. But if the day-in-and-day-out experience of work isn't positive, why would anyone stay? We are well past the 1970s when women

were opening doors to be able to work in fields they had been culturally barred from. That generation knew they wanted to do the work, wanted to change the culture, and the workplace would not be welcoming. Not so today. The current generation of women in tech may expect equality, value, and the ability to do the work they enjoy. Today, women are working in many industries, but the bad reputation of technology is not inviting them in. Tech companies compete for talent, and that means more than money, benefits, and free food. The “problem” of women in tech isn’t a “woman’s problem”; it’s a technology work culture problem. Let’s start to understand it.

IS TECH CULTURE THE RETENTION CULPRIT?

The poor retention of women in tech is especially troubling since 74% of women in tech report “loving their work”.^[7] But, unfortunately, too many women are not choosing or staying in technology

*Retaining women in tech
isn’t a woman problem—
It’s a tech culture problem*

jobs. The culture of the workplace in technology companies is often targeted as the source of the problem. Over the last 40 years, reports of gender discrimination and sexual harassment have increased (e.g. ^[19, 26, 46, 84]). Research into why women leave the field points to

workplace factors and the overall culture as key reasons.^[18, 80] Here are some persistent findings:

Stereotyping: The more stereotyping and bullying experienced, the shorter the length of time that employees remained at their previous company.^[78] Fifty percent of women in STEM jobs say they have experienced gender-related discrimination in the workplace, more than women in non-STEM jobs (41%), and far more than men in STEM positions (19%).^[27] Perceived role ambiguity, lack of community, unfairness, and interpersonal conflict are common complaints.^[81] Women’s intentions to stay on the job are lowered when they see other women undervalued, belittled, or ignored.^[53]

Male-dominated culture: Tech is a male-dominated culture. Any male-dominated environment is generally associated with more harassment of women. As a result, women have higher stress and are more likely to leave the job.^[69] This creates a hostile workplace for women.^[18, 80] Tech makes these dynamics worse because the field of technology itself is seen as masculine.^[73] So, men feel they belong in the tech field and women can feel they do not fit in.^[35, 86]

Competitive culture: In a “hero” culture, the hero engineer who saves the project at the 11th hour is rewarded, not the employees who work to prevent problems and deliver on time. A competitive hero culture often contradicts the espoused company culture, which cites collaboration as a key value. This “ethos of competition” alienates women and undermines a collaborative environment.^[72]

Espoused values: We like to say that tech is a meritocracy, that success is all about skill. But women's skills are perceived through the lens of gender expectations. Women's coding, for example, is evaluated more harshly.^[87] Companies may declare that they are supporting diversity. But that doesn't make it so. In fact, companies that believe themselves to be the most meritocratic are often the least, because they do not take action to mitigate inevitable gender expectations.^[23, 68] So, companies with an espoused value of meritocracy may ironically show greater gender bias.^[14]

These findings highlight that the implicit workplace culture of technology companies creates a negative daily experience for women at work. And for women of color in tech, the negative workplace experiences are significantly worse.^[45] Competition, stereotyping, ostracization, conflict, and lack of interpersonal safety are too often what women face when choosing to work in technology.^[16] To retain women in tech, we must make real changes in the experience of daily life at work.

This research points to culture as the starting point for change. But culture is vague. How it plays out in behavior between people is idiosyncratic and hard to characterize. Women absolutely can experience a negative workplace, yet some women in tech do stay. We have documented the negative experience, but do we really understand what is going on in the tech workplace? Do we understand what is necessary for women to thrive? What are the work experiences of women who do thrive? To make real change, we must shift the inquiry to include understanding why women stay.

DOES FAMILY AND HOME/WORK BALANCE MATTER?

A second oft-cited problem of retaining women in tech is the issue of home/work balance. If only we had better support for family, goes the thinking, women would stay. But is it really a root cause? Another hero mindset is that tech workers need to be available 24/7 to get the product or deliverables out. Engineering culture is thought to discriminate against working women with family responsibilities who can't devote 24/7 to the job. But it turns out that other hero industries such as medicine, law, and business have the same expectations for work, yet the numbers of women in those fields are higher. Every industry must do better to support a balance between family or personal life and work. But recent studies show that family issues are not the primary or the main reason women leave technology occupations.^[55, 80, 83]

Family issues are not the main reason women leave technology careers

Introducing family-friendly policies is good; technology companies, like others, are making some headway. Some corporations are increasing parental leave, building nursing rooms, making lists of childcare workers available, and creating support programs for new parents.^[59] But, of course, parenting demands last much longer than the first few months after birth. Many of these "new" approaches were tried in the 1980s at companies like Hewlett-Packard, which offered job

sharing and other types of support. But we have a long way to go to a work culture that truly supports real careers for all parents as they care for their children.

More importantly, a focus on home/work balance as a “women’s issue” perpetuates negative expectations and stereotyping. Declaring that family support is something that is being done “for

Managing family isn’t a “women’s issue.” Men depend on home/work policy more than women

women” suggests that women need special treatment, that they are less capable of handling a job than men without support. And it implies that family duties affect women more than men, thereby perpetuating traditional role expectations.^[1] But interestingly, it is men with family obligations who depend on family/work balance

the most. Women are more resilient; they know how to juggle their commitments.^[66]

Fixing family policy is a good corporate goal. But since home/work balance is not the root cause of why women leave tech, it is not the root solution. Providing parental support is a must for every company, as we learned so well during the COVID pandemic. But fixing family policy will not be the quick fix to hiring and keeping women in tech.

THE WOMEN IN TECH RETENTION PROJECT: WHY WOMEN STAY

Recruiting women into a culture that then rejects or repels them undermines all the hard work done to increase women’s interest in technology fields. But not all women leave. Let’s take a new approach and ask why women thrive. What are the practices, interactions, relationships, and personal strategies that help women succeed? This is the goal of the Women in Tech Retention Project launched in 2014.

Through a series of qualitative and quantitative studies, we explored the daily work experiences of women in technology companies doing jobs at the heart of product development. These women represented a mix of races, ethnicities, ages, household types, job types, career lengths, and sexual orientations. The focus of this initial research was to understand what keeps women committed to tech work and helps them thrive. We began with in-person contextual interviews^[39] focused on understanding the daily life experiences of successful women. We wanted to understand what draws and keeps them engaged at work. We explored the everyday experiences of product teams,

Those with lower scores on key factors are more likely to be thinking of leaving their job

management, evaluation, promotion, and working with others. We did not focus on issues related to recruiting, family benefits, or sexual harassment unless the women raised them.

In these qualitative interviews, we examined what contributes to success for women and if the lack of those same things nudged them to leave a job. The emergent factors that help women thrive let us explore if these are the missing experiences underlying why women leave a job. As applied researchers, we also sought to understand and find the most

powerful intervention points, areas where companies might change their practice, policy, programs, or management approaches.

Through our analysis, we identified the key factors essential to why women stay in technology jobs. The factors are organized into The @Work Experience Framework discussed in [Part I](#). Here we briefly describe them.^[25, 38, 40, 58]

Dynamic, Valuing Team: Women thrive in a dynamic, work-focused team and/or partnership where they can lead, follow, feel valued, and talk about life outside of work within their team.

Stimulating Work: Women love working on challenging technical problems, products, or research questions important to the company, the industry, or the world. They switch jobs when bored.

Push & Support: Women may not feel qualified for the next challenge. But when pushed by trusted managers, colleagues, or family, they take it on and succeed—provided they have support to strategize with others, ask questions, and falter.

Local Role Models: Women need coaching relationships in their company to help them succeed. Work buddies with more experience help them navigate their careers. Senior co-workers and managers also reveal the experience of daily life after promotion. If their lives look undesirable, women may not seek promotion.

Nonjudgmental Flexibility: Women with children thrive if the team and managers flex to everyone's life commitments. These women too often feel judged for meeting home commitments. Being given flexibility by the team and managers shows them that they are valued.

Personal Power: Women can have self-doubt about their skills, readiness, and value. Self-esteem increases with positive feedback, helpful critique, clear expectations, and good coaching.

We validated these factors and further explored women's experience through a series of surveys with more than 900 respondents worldwide.^[40] The resulting @Work Experience Measure is a 15-minute survey assessing employees' experiences related to the factors. This quantitative research validated the importance of these factors as necessary ingredients to a positive working environment.

One of our most telling statistics is that both women and men who reported that they were “thinking of leaving the job” scored lower on all the factors above except Nonjudgmental Flexibility, which is related to home/work balance ([Figure 0.2](#)). Given the research findings on family issues discussed above, this is not surprising.

Interestingly in our quest for factors of workplace experience that matter to women, we also found the work experiences that matter to all. But clearly since so many more women leave the field than men, the tech work culture is not delivering these critical work experiences to women as reliably as to men.

Armed with key factors we now have a practical starting place to develop a strategy to guide organizational change. Change is never easy but having a direction makes it possible.

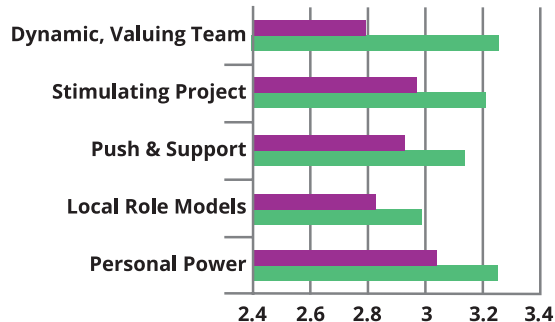


Figure 0.2: The @Work Experience Factors: Differences between people who are thinking about leaving their job (purple) vs. not (green).^[40]

PRACTICAL INTERVENTIONS THAT WORK

Wouldn't it be great if people could just figure out how to work together smoothly? Everyone is looking for the secret sauce, the quick fix, the policy change, or the workshop that would make the tough task of diverse people working together go away—or at least feel approachable. We are often asked, why is the technology industry different from the other hero professions? Certainly, these professions have their challenges and will benefit from many insights of our work. We hope so. But these industries are not failing to attract and retain women in the same way as tech. What's the difference?

Technology is a “maker culture.” In a maker culture, people of different job roles must collaborate and coordinate continuously. A maker culture is also a continuous feedback culture where co-workers, customers, and the response of the market evaluates the work of the team and its members daily. A maker culture means people must work nose-to-nose with others to understand customer needs, invent, design, critique, code, and get buy-in for whatever they are making. This level of collaboration and feedback may characterize the bulk of a maker's workday and week. A maker culture depends on getting along with others and being in a team in ways that are simply not required in other professions.

The demand for smooth, fast collaboration may be one of the reasons that the exclusion processes are often found in maker cultures.^[4] Intense interaction comes more easily with people that are like me. As a result, maker cultures run the risk of marginalizing outgroups like women and other diverse people. Marginalization undermines the dynamic collaboration necessary to include diverse perspectives on a team. But a maker situation is exactly the kind of complex challenge that benefits from diversity.

Tech is a maker culture with different teamwork demands than other professions

To perform well, people need to feel valued both as members of the team and for their individual characteristics, behaviors, and contributions.^[76] Ostracization effectively undermines women's sense of belonging and value that is key to thriving at work. So, it is not surprising that our research shows that women thrive in technology if they experience a dynamic, valuing team. More importantly, when people report having positive experiences working with their team, they are also less likely to be thinking of leaving. See Figure 0.3.

People with positive team experiences are less likely to be thinking of leaving their jobs

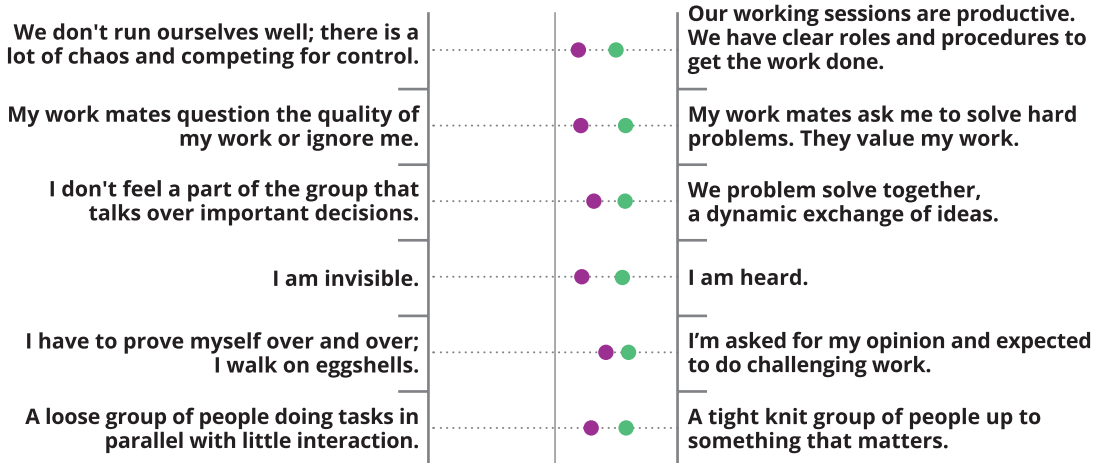


Figure 0.3: Items of the factor “Tight Cohesive Team” showing the differences between people who are thinking about leaving their job (purple) and those who are not (green).

Any maker culture is heavily team based and interpersonally challenging. It requires that people get along professionally while innovating in a fast-paced, dynamic creative environment. This is a challenge for any group of people. Now add diversity and the challenge increases. We need effective diverse teams in technology. We need diversity for great solutions. We need to grow a diverse workforce. And we want everyone, including women, to pursue the tech work they love. But the more diverse the people, the greater the challenge. So, what do we do?

INSANITY IS DOING THE SAME THING OVER AND OVER BUT EXPECTING A DIFFERENT RESULT

At the Grace Hopper Conference in 2018, 20,000 women in technology with diverse backgrounds came together in one room for the opening keynote. The stadium, indeed, the whole city of Houston, Texas, was filled with women who work in and want to work in technology. Female speakers on the stage gave inspiring talks to show what is possible as a woman in tech. Women led workshops,

gave talks, and showed their leadership. It was a grand celebration of women—and it communicated that no woman in tech is alone anymore.

The Anita Borg Institute was founded in 1987 to bring technical women together to discuss issues they experienced at work and share resources. Anita Borg, Telle Whitney, Grace Hopper—all groundbreaking women in tech—inspired forums for women technologists to feel their power and support each other. Since then, women’s groups have been created in cities where women in tech work and within many companies. The notion is that when women gather, they can gain support and perspective from others who share their challenges and experience. Networking groups constitute one of the first interventions developed to encourage women’s success in tech.

Years of research into women’s issues, gender roles, and bias have repeatedly revealed that socialization in families, school, the workplace, and countries defines and enforces gender differences and opportunities. To make change for women gender bias was attacked with training and workshops that have been delivered within and outside of businesses for 40 years.^[20] Assertiveness training and other programs to enhance self-esteem and confidence have also grown. Professional development programs have been offered to promote women’s leadership.^[6] Training and workshops for women in tech include self-awareness, self-efficacy, personal visions, developing coaching relationships, and more.^[92]

We have been using networking, bias training, and self-development workshops to try to change the culture and people for decades. But today, for example, women in tech are still judged to be less competent than men and the quality of their work is judged as poorer.^[64] Most would vehemently deny that we judge the same work differently based on whether it was created by a woman or a man. Many people think we are beyond this kind of bias but unfortunately, we are not. Gender stereotypes and bias remain with us unconsciously and affect our judgment and choices.

Recent research into stereotyping shows that people discriminate without awareness or conscious control. This is the reason why modern assessments of stereotyping measure response

Even with years of effort and training, bias and stereotyping persists

time or count mistakes made under time pressure to uncover implicit associations with gender. For example, if people find a word like “warm” faster when it follows the picture of a woman than when it follows a picture of a man, this is taken as an indicator that

women are associated with warmth. A quicker response shows that we have an internalized bias that women are expected to be interpersonally warmer than men. Tests of implicit associations show that gender shapes our judgment about a person’s character, abilities, and potential.^[9, 34] And these automatic gender stereotypes are something we all share. Women as well as men judge women to be less competent.^[8] Unconscious bias means we are all unaware of how we may stereotype others.

Learning about implicit bias and providing professional development for women is important. Awareness allows people to better monitor their behavior to align it with their values. Aware-

ness and the development of individual skill are necessary. Unfortunately, women's sense of belonging and feelings of discrimination are largely unaffected by whether their departments complete a diversity training.^[64] Changing unconscious behavior is hard—just changing ourselves even when we want to is hard. Now add the interpersonal demands of a maker culture. It is not surprising that these approaches have had little effect.

Networking, mentoring, awareness workshops, and training have been tried for years. They helped us become aware of gender bias as a society. But these approaches are clearly not enough to radically shift company culture or the culture of everyday work. With all the effort and the goodwill of good people, the number of women in tech continues to flatten and drop. Women are walking away from our field.

Women report discrimination even after their group has diversity training

Insanity is doing the same thing over and over and expecting a different result. It's time to step back and develop new approaches.

STRUCTURE FOR FREEDOM: PRINCIPLES AND PRACTICES, NOT PERSONALITIES

William Edwards Deming, a well-known quality guru, told managers that the key to quality products is to manage their processes. Six Sigma, Agile, user-centered design, and more are based on a philosophy that if companies want a quality product, they must manage how they do the work. The idea of focusing on managing work processes and practices instead of individual performance is a radical departure for most people. Focusing on processes, practices, and procedures is particularly hard when we are prone to see the problem as people's behavior. When we interact with our team, our manager, or a person in the company, we might feel valued or devalued—welcomed or pushed away. When we interact with people, it feels personal. So, it's hard to imagine that we can effect change by focusing on how we do the work instead of the personalities and behaviors of those we interact with.

RESTRUCTURE THE PROCESS TO CHANGE BEHAVIOR

Researchers and educators have found that when women are working with or surrounded by a majority of men, their performance is impaired. One early intervention to change women's participation was to create or reinvent all-women schools for the expressed purpose of fostering women's leadership. In a mixed-gender environment, young women did not naturally assume leadership roles or speak up as did men. But in an all-female setting where no men were around to assume these roles, women took the lead. "Students have the same classes but being in a setting with only women changes their behavior. They take on leadership roles, speak up, challenge each other" says Juliane

Siegeris, professor of software engineering, who established the women-only computer science program at the University of Applied Sciences in Berlin.^[79]

The women in all-female schools naturally change themselves because the school deliberately changes the situation they are in. Karen adopted this approach in the early 1990s when coaching a product team to use Contextual Design, a well-known user-centered design process.^[39] Karen explains:

We were coaching a team with six men and four women. The men were jumping into the ideation process. The women were silent or asking the men how “we” should solve things. Rather than tell anyone to change themselves or participate differently, we changed the setting. We split the team into parallel visioning sub-groups, giving the women a group of their own. The women then started throwing out ideas, participating, and inventing. Afterward, we talked to the women about what happened. When we put the team together again everyone participated.

Deliberately installing same-gender teams is a good example of how changing the environment changes behavior. We are not saying that technology companies should create all-male and all-female teams—although a little experimentation might be warranted. And we know that this kind of segregation can foster unequal opportunities and unhealthy competition. Our point here is that to change behavior we don’t have to ask everyone in an organization to become unbiased. We just need to alter the context in which people interact, work together, and make decisions.

The use of blind reviews is another example of changing the situation to change the result. When the gender or race of candidates for a job are known, reviewers are inordinately influenced by their biases. Identical papers or resumes are rated higher when they are labeled with a men’s name versus a women’s name.^[11, 63, 65, 74] The current best practice is a blind review for job applicants or academic papers, resulting in more women applicants interviewed and papers accepted.^[52, 97] Without a picture of the applicant or their name revealing gender, the reviewers focus on skills, experience, and quality.

A blind audition when hiring musicians for orchestras is a powerful example of the power of changing a process to eliminate bias. Orchestras ask candidates to play behind a screen so that the jury cannot see their gender. The effect is an eye-opener. Not knowing gender heightened women’s chances to be advanced by 50%.^[32] The hiring jury is trying to hire the best musician for the orchestra. But gender bias plays a role when the jury can see the musicians. Eliminating that bias is easy with a simple change in the process.

To interrupt biased behavior, change the work context practice

“Stop simple diversity training focused on raising awareness,” appeals Iris Bohnet.^[12] Her work as a behavioral economist champions “gender equality by design”—reducing the impact of unintentional bias by redesigning the process. For example, Bohnet describes the results of her

research into volunteer behavior. In same-gender groups, women and men are equally likely to volunteer. When a team is made up of different genders, the situation changes. Women volunteer more than men. Women spend more of their time doing things that the whole team benefits from, often to the detriment of their own career advancement. But when everyone is rewarded for volunteering for these team chores, men volunteer more often.^[12] Rewarding the desired behavior reduces gender differences.

The authors routinely help manage diverse teams by redesigning the processes that those teams use to get the work done. In this example, Nicola shares her experience with project planning in software engineering teams.

Estimates of how long work will take have a direct impact on the ship date and the profit of a project. Teams we have observed frequently sabotage themselves by agreeing too fast. They may not listen to the one person who has it right. Or they may take a mental shortcut and follow the person who is seen as the leader or the expert. So, to be sure we heard every person's voice and get more reliable estimates we instituted planning poker.

Planning poker is a method popularized in Scrum. It asks each team member to privately create their own time estimates from a sequence of values expressing their hunch of how much work the team needs to do for a given plan. First, individual team members complete their private estimates. Only then do they share it with the team. As in a poker game, the team members only reveal their cards when asked. This approach ensures that everyone participates and that outlying thinkers are not swayed by the initial majority.^[62] The result is not only a better estimate but also a change in the experience. As Sylva told us:

I used to always let others talk when it came to estimating workload. I thought they knew better because most of them had more experience. With planning poker, I'm forced to give my own estimate. It starts important conversations, and we get better results that way.
Sylva, Software Developer

Changing the process changes behavior. This is not a special approach for diversity and gender issues. We redesign our processes to achieve a better result all the time. If we know the kinds of interactions and behavior that will help women thrive, we can design our way to diverse teams that work for everyone. Like Bohnet, the authors maintain that creating solutions to retain women in tech is a design challenge. And like any design problem, we start by gathering data to understand what is going on. Then using that data, we create and iterate practical solutions that work for real tech teams working together. Changing people is hard. But redesigning practices to interrupt bias is possible.

UNDERSTANDING TEAMS

At the center of a maker culture is the team. As we have said, how women experience daily work with their teams is critical to retention. So how diverse teams work, how good teams work, is something we must understand. Only then can we consider redesign options.

When people come together to solve a problem, it takes them a while to organize themselves to be productive. Both research and anecdotal experience from people who have lived through team formation suggest it is not always easy. Some teams succeed and some do not. Existing models of team dynamics all expect turbulences at some point. Bruce Tuckman has identified key phases in team development. Before becoming productive they go through what Tuckman calls forming, storming, norming, and then performing.^[89] In other words, all teams take some time to figure out how to work together before they work together smoothly.

All teams have turbulence before figuring out how to work together—then they get productive

Connie Gersick further found that teams do not display a steady curve of performance. Rather, the length of the lifetime of a team influences when teams become productive. In the beginning, teams do very little, they engage in status seeking, procrastinating, and self-organizing. Then at the temporal midpoint, the team really starts being productive. Give a team seven days to do a task, they get started in earnest on Day 4. Give a team 12 weeks, they get started in earnest in Week 6.^[30] Given an end date, a deadline, or a shipping date the midpoint of a project is the moment that is galvanizing and leads to a burst of activity in the team (Figure 0.4). Agile practices and their strict focus on timing make use of this team phenomenon when they define short sprints to move the work along.^[62] Again, by changing the process, in this case the length of time, we get a different result from people.

In the quest for understanding what makes a good team work smoothly, Google's analytics team spent over two years investigating what makes Google teams great.^[22] Google found that successful teams had formed a set of roles defining each person's responsibilities, a set of values related to how to get the work done, and a set of norms for interacting. The goal of every product team is clear: define, validate, test, and ship a product. But successful teams then defined how they worked together and the process they used. Some of Google's successful teams were more leader-dominated and some were more collaborative. In the end, the exact roles, values, behaviors, and process to get the work done didn't matter. Having roles, values, behaviors, and procedures that all agreed on did.

The team culture, the team's roles, values, accepted behaviors, and ways of working, were co-created and adhered to by all team members. Having a goal and knowing how to work together

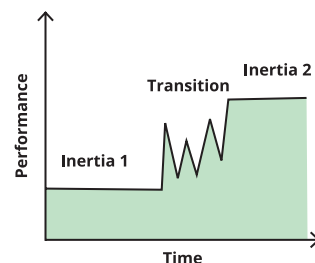


Figure 0.4: The work pace of teams: The more time you give a team the longer they take to be productive.^[30]

helped the team be productive. What about diversity? Google researchers found that the group's norms typically override individual proclivities and encourage deference to the team. Teams that have a defined team way of working performed better irrespective of their diversity. Team culture creates a small social microcosm. People within this social group, no matter how different the individuals, both adjust to and co-create the way the team functions.

Diverse teams work well when they have clear roles, values, processes, and accepted ways of interacting

In other words, when teams have clear roles, values, accepted behaviors, and processes to get the work done, people collaborate productively. When they don't, they have conflict. So, what if we did it on purpose? What if the team culture and way of working were well defined and known by the members? What if we deliberately defined how we work together? Could we skip some of the turbulence? If team culture and process trump our biases, can we manage diverse teams by defining key processes, goals, roles, and norms?

Jen, a software development manager we interviewed, gives us a hint at an answer. She merged two Scrum teams that each had lost people. Both teams were working on the same larger product and were using standard Scrum processes. Jen knew Tuckman's research on teams, that any change in the team configuration, with people joining and leaving the group, will send the team back to storming to redefine how to work together. Here's what happened:

I expected the teams to go through a period of storming before they became productive. I called in the Agile coach, who explained that because the configuration of the group changed, they should expect turbulence. But surprisingly it didn't happen. Instead, the two teams each pulled out their Agile Team Manifestos, which state how the team agreed to work together. They examined both documents, looked for overlap, discussed any conflicts of values or behaviors, and created a new Manifesto that they all agreed to. Then they redistributed the roles and got down to work. They jockeyed a little for a week before they were off and running productively.

Jen, Software Development Manager

Why did this team adjust so fast? Because everyone on the team knew what to do. They knew their role within the project, the skill they brought to the team, the processes they were to use, and the values of how to work together. In other words, they had a clear team culture. So often when we think about culture, we pay attention to corporate culture. We don't pay attention to the team culture, the implicit rules, roles, processes, and agreements on a team. But that is what makes or breaks working together.

Corporate culture is ephemeral. We know it can affect the everyday way of working and how people treat each other. And we also know that espousing a culture of equality, respect, and collaboration doesn't make it so. Corporate culture is hard to change, but team culture is much easier.

In any maker industry, nothing will get made unless there are clear roles, processes, and expectations for collaboration. In tech, we routinely change, adopt, and adapt processes to increase the quality of what we make. Over the last 30 years tech has redesigned product development processes

Agile techniques like a Team Manifesto can help teams articulate their team culture

with practices like user-centered design, design thinking, Agile, and quality practices. We know how to do this—we just need to find the right techniques and practices to transform the experience of diverse teams. Then we can reap the value promised by diversity and retain women in tech.

FINDING CRITICAL INTERVENTION POINTS

The everyday work life of diverse teams contains many practices, interactions, relationships, values, and attitudes. We have already said that changing attitudes by increasing awareness of bias does not by itself improve the daily experience of women in technology companies. We have also said that effective interventions influence how we work; effective interventions do not target individual people for change. By adopting new practices informed by gender issues we can interrupt bias. We can ensure that all voices on a diverse team are heard and that women thrive. When all members of diverse teams participate fully, when their perspectives inform product design, we foster more successful products. For this, the whole diverse team must work well together. So, effective interventions to help women thrive must also work for the whole team. Given this perspective, what practices should we target for intervention?

Our approach to identifying the most impactful intervention points always starts with in-depth qualitative research to identify key themes. The qualitative and quantitative research that led to The @Work Experience factors pointed us to critical experiences necessary for women to thrive in the workplace.^[25, 38, 40] These findings identified what women need but also revealed processes and experiences to target for additional research projects. Data from all projects provided the context for ideation to derive specific intervention recommendations: redesigned work practices, new technology support, games, workshops, and fun representations of interpersonal dynamics. We honed these intervention ideas by working with managers and people on diverse teams to try out and iterate the interventions. In-depth experience data tells us where to direct ideation; iteration with real working teams tells us whether our intervention ideas will work.

The stories of women's lives that we share throughout the book come from in-depth interviews with 150 participants and related survey data with over 1000 participants across multiple projects. The overall population of our collective research represents a wide variety of people from around the world and from many types of technology organizations. See the [high-level description](#) of the participant demographics.

Our WIT Research: Participant Demographics

Throughout the book we refer to people we have interviewed and results from our surveys. Below is a description of their high-level demographics across all our Women in Tech (WIT) research efforts related to women's experience in technology companies. To validate the factors through a survey we paid for a panel of participants. All other survey participants were world-wide volunteers.

Participants: Across all research projects we used Contextual Inquiry techniques to interview 150 people. We also surveyed over 1,000 participants.

Gender: Approximately two thirds of all participants were women, one-third were men, and 1% were non-binary.

Sexual Orientation: Of all participants, approximately 10% identified as LGBTQ+.

Ethnicity: We did not explicitly sample for ethnicities or race. But because our survey data was worldwide it includes multiple ethnicities. About two thirds identified as White/Caucasian, 10% Asian Indians, 5% Black/African Americans, 5% Hispanic/Latino, and 10% with other ethnic groups. Our qualitative data also includes people from many ethnic backgrounds whether they were born in the United States or elsewhere.

Age and Marital Status: Participants were primarily between 25 and 50 years old. One fifth were single, two fifths lived with a partner (but without children), and two fifths lived with children.

Geographic Location: The majority of the participants lived in the United States. In addition, approximately one third lived in Germany and 10% lived in other countries, primarily India, the UK, Austria, Switzerland, Canada, and Mexico. We also asked our participants whether the country they lived in was their country of origin. About a quarter said that they originally came from another country. So even though our participants were weighted toward current U.S. residency, they represent multiple countries of origin.

Organizations: All participants worked in tech. Almost half of them worked for companies that are known for making software, 10% worked in consulting and professional services, 5% worked in higher education, and the remaining participants worked in other branches of tech or in tech divisions of other industries such as automotive or retail.

Job Types: For most research projects, participants were recruited to be developers, designers, user researchers, product managers, project managers, or people managers. We also had a smattering of people from other technology jobs. All participants were involved with teams making software products, systems, websites, or related work products.

The projects we draw upon include The @Work Experience Framework research; the Career Power board game development that articulates work situations and career challenges; the new hire and onboarding research leading to The Team Onboarding Checklist; The Valuing and Jerk Project to identify key behaviors that impact interpersonal relationships; and The Remote Work Project during the COVID-19 pandemic to understand the overall impact of remote working in diverse teams. We also draw upon data from Nicola's team using a living lab approach to work with women in German technology companies over a 3-year period.²

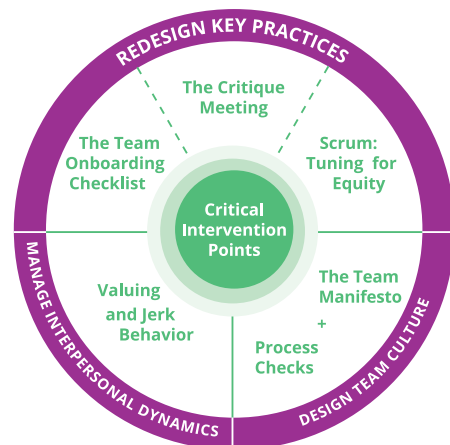
Some of the interventions we share with you have emerged directly from this research. Some research findings pointed us to the importance of practices the authors have developed in our collective experience consulting with diverse technology teams over many years. All the interventions we share are designed to be practical. Practical interventions are those which can be implemented and used by everyday team members and managers.

We have learned that “boiling the ocean,” trying to change the whole corporate culture and each person in it from the top to the bottom, is not a reasonable goal. Instead, we look for techniques that can be easily adopted by managers and team members to start making changes to improve how diverse teams work in their organizations.

The interventions we describe fall into three areas of impact: key practices, interpersonal dynamics, and team culture. (See the diagram of critical intervention points.) Redesigning key practices that impact women's experience at work can clarify expectations, provide information needed for success, and disrupt bias. We cover interventions for team onboarding, how to run a critique meeting, and ways to tune Scrum so it ensures all voices on a diverse team are heard.

Our second area of intervention addresses interpersonal dynamics, one of the most cited issues for women in tech. The Valuing and Jerk Project identifies specific behaviors which stimulate the feeling of value and those which undermine it. We introduce the valuing and jerk character posters and how to use them in a team workshop and 1-1 interactions.

Last, we introduce interventions to define and continuously monitor team culture which too often undermines women's experience at work. The Team Manifesto helps teams form a shared understanding



² Nicola's team used a living lab approach^[2-3] to understand and create interventions to improve women's experience in technology companies. A synthesis of interview transcripts, field notes, and notes from informal interactions informed our analysis of Agile techniques with people in a variety of roles and ages. It was partially funded by the German Federal Ministry of Education and Research (BMBF), grant numbers 01FP1603 and 01FP1618. The responsibility for all content supplied lies with the authors.

of how they want to work and interact. The Process Check helps the team monitor and reflect on how well they are working together.

As an industry, we are poised for change. Tech companies know they want and need women. They need diverse people to fulfill jobs and ensure innovation. Women love tech work but will not stay unless we provide the kind of daily work life they need to thrive and excel. Our goal is to put knowledge and tools in the hands of everyone so we can influence our industry together. These interventions, and the associated principles of redesigning processes, give you a place to start redesigning your organizations.

OVERVIEW OF THE BOOK

This book shares our insights and perspective on how to better retain women in tech. Through our research, we have identified what women need to thrive and key intervention techniques to help improve the daily work practices of diverse teams. We share our findings and our interventions to help you address retention in your organizations. We also share academic research to provide additional perspective.

The structure of the book starts with this Introduction laying out the challenges of retaining women in tech, our work, and our approach to change. The remainder of the book is structured as follows.

Part I describes the six factors of The @Work Experience Framework that we have identified as essential for women to stay in technology jobs.

Chapter 1: A Dynamic, Valuing Team That's Up to Something Big. We describe what women are looking for in their teams and what gets in the way of team cohesion. We look at the experience of being a dynamic team and its primacy of the team for retention.

Chapter 2: Stimulating Work. We discuss women's need for challenges and what they consider to be stimulating work. We raise up the role of bias in work assignments and perceptions of women's technical competency. We emphasize the role of boredom in retention.

Chapter 3: The Push and Support. We describe the importance of pushing women into challenges that they may hesitate to take on. We also emphasize that to be successful in that challenge, women need support from their co-workers and managers through conversation, coaching, and tolerance of failure. Here we address the role of challenge for retention.

Chapter 4: Local Role Models. We emphasize the role of local senior people in developing effective successful professional women. We discuss women's perception of job promotion and how the behavior and lives of senior people impact whether women wish to advance. We emphasize the need for effective coaching support for retention.

Chapter 5: Nonjudgmental Flexibility for Family Commitments. We explore the role of the team in communicating their willingness to support family obligations. We emphasize how the team's flexibility counteracts women's feelings of being judged negatively for taking time to care for children.

Chapter 6: Personal Power. We explore the way women build self-confidence and counteract their self-doubt through interactions with co-workers. Confidence allows women to participate fully in their team and contribute value. With confidence, women build their sense of Personal Power and are less likely to leave the field.

Part II describes recommended interventions that affect daily work practices, interpersonal dynamics, and team culture. We introduce each intervention and the issues for women that it addresses. We provide practical guidance on how to use each intervention and links to where support materials may be downloaded.

Chapter 7: Team Onboarding. We share the needs of new hires, the timeframes managers should consider, and the eight building blocks of connection and success that form the basis of the Team Onboarding Checklist. We share the checklist and how to use it.

Chapter 8: The Critique Meeting. We explore the challenge of creating a feedback culture and issues for women receiving critique. We share a critique meeting process and the principles behind it. We provide clear steps for running the meeting.

Chapter 9: Sneak Attacks on Key Processes: Agile. We introduce the importance of explicit practices for improving and managing women's participation and success. We highlight how making practices explicit also helps the team's overall success. Using the Agile practice of Scrum as an example, we share The Analysis Matrix, our tool to help identify where practices, values, and expectations are implicit. Using Scrum, we provide examples of how to tune a practice to be more explicit.

Chapter 10: Valuing and Jerk Behaviors. We define the key valuing and jerk behaviors and their relative value to women and men and the character posters created that represent them. We describe a workshop using the posters to help individuals and teams increase valuing and manage devaluing behaviors within the team.

Chapter 11: Building Resilience: Team Manifesto and Process Checks. We introduce the need for explicit values, expectations, professional behaviors, and a code of conduct to build a team culture. But for real impact, the team needs to become reflective and committed to continuous improvement of how they collaborate and work. These techniques help build resilient teams.

We end the book with the **Conclusion: Principles of Process Intervention for Retaining Women in Tech.** In this chapter, we reflect upon the principles we use to guide creating interventions and redesigning the practices to work better for all members of diverse teams. We also bring together high-level implications of The Remote Project for women's experience.

Throughout the book, we invite you to use our knowledge and principles to invent interventions that will work for your situation and organization.

