

## Doubling Women in Semiconductor Leadership

WI GSA

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## Executive summary

With Moore's Law reaching a practical limit to produce improved chip performance economically, the semiconductor industry is now looking for new opportunities to fuel future growth and prosperity in the industry. One area being closely looked at is the emergence of exciting new technologies such as AI, 5G, loT, and advanced driver-assistance systems (ADAS). These applications are creating demand for ultra-dense chips and application specific semiconductors. As the industry looks to capitalize on these opportunities, many semiconductor companies are also readily embracing growing trends such as new monetization business models and cyber resilience in chips. ${ }^{1}$

As the industry searches for new ways to grow and expand, one largely overlooked area that continues to exist is the employment and advancemen of women. The failings in this area have only been compounded by the recent COVID-19 crisis where the pressures of the pandemic are pushing hundreds of thousands of women around the country out of work or into burnout. ${ }^{2}$ A recent study even shows that men have been promoted 3 times more than women during the pandemic. ${ }^{3}$

This white paper will highlight this issue by outlining the key findings from a joint research study by the Global Semiconductor Alliance (GSA) and Accenture on gender equality based on surveys and executive interviews. Best practices currently employed in the industry will be highlighted as well as areas of improvement and an action plan for semiconductor companies to improve their gender diversity. This plan and best practices are focused on four key areas - recruitment, retention, career advancement and education. These can serve as a beacon of light for other semiconductor companies to follow in their global quest for gender equality, which is an important goal given today's rising social issues and events around racial and gender diversity. In addition, because the scope of the interview questioning was done prior to the adverse effects on women during the pandemic. This paper will also highlight ways companies can combat burnout and women leaving organizations as a result of current COVID-19 pressures


## Opportunity statement

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## Respondent demographics

Today the median for women representation in the total semiconductor workforce lies in the 20-25\% range. This representation falls to under $\mathbf{1 0 \%}$ as roles progress from individual contributors to managers to board-level roles. In its second annual joint Women in the Semiconductor Industry research study of gender equality in the semiconductor industry, the GSA and Accenture measured statistics of gender representation throughout all functions and ranks. The results from this 2020 study underscore the significant underrepresentation of women in the semiconductor industry with gender inequality highest in eadership and technical roles. In 1965, Gordon Moore, future cofounder of Intel Corporation, extrapolated that computing would dramatically increase in power at an exponential pace. Applying this insight, known as Moore's Law, to the global workforce could help double the number of women in leadership roles in the industry, double he capital dedicated to women-led start-ups and double the number of STEM-focused women joining the industry ${ }^{4}$

Overview of the GSA and Accenture Women in the Semiconductor Research Study
For its 2020 research study ${ }^{5}$, GSA and Accenture surveyed nearly
100 respondents located throughout North America, EMEA and the Asia-Pacific. As shown to the right, the 2020 Women in the
Semiconductor Industry research study results saw higher participation of the largest companies with 25,000+ employees. The study also had the majority of participation from companies headquartered in North America.

By type of company


By revenue size


By number of employees


Blank ||

## By HQ region



The GSA and Accenture Women in the Semiconductor Industry research survey results highlight three prominent trends all pointing to an underrepresentation of women in the semiconductor industry.

## Recruitment

| Compared to 2019, fewer companies in 2020 cited very low (<10\%) representation of women overall and in tech roles.
| For larger companies, women representation of total new hires improved, but technical hires declined in 2020.

## Retention

| A greater percentage of respondents reported over $25 \%$ representation of women in technical roles with 2-5 year tenure (from 29\% to 40\%) and over 5 -year tenure (from 31\% to 43\%).
\| Except in leadership roles, attrition of women is higher in larger companies.

## Career Advancement

| Nearly half of respondents reported $20 \%$ or more women in their total workforce, but less than $10 \%$ in director positions and above.
| Larger companies continued to trend toward more promotion and overall representation of women technical managers.

The data from both 2019 and 2020 showed that the larger the company, the higher the percentage of women in the workforce. Generally, larger companies have more investment and resources to implement mentorship programs and other career pathing strategies to enable the advancement of women into higher levels of the hierarchy. Inphi Corporation is a good example. According to Sun Kim, CHRO and senior vice president of Human Resources at Inphi, "Currently we offer
development opportunities that include stretch assignments, project leadership roles and individual development plans tied to employee aspirational goals. We highlight women in leadership by recognizing promotions of women.

The research data also shows that women are staying longer in tech companies. In 2020, a higher share of companies has $30-40 \%$ of their women tech employees staying longer at the company. In addition, half of the large companies surveyed reported having $30 \%$ or more of their women tech employees staying longer than five years.

## Three key opportunities to close the gap

Based on the GSA and Accenture Women in Semiconductor Industry research study results and executive interviews, three key areas of improvement were identified to help close the gender equality gap.

## | New Look at Recruitment Efforts

| Retaining and Advancing Women Talent
| Education is the great equalizer / "Round-out" the Women in Semi

2020: Tenure of women in technical roles


## New look at recruitment efforts



## New look at recruitment efforts

2019: Recruitment of women overall and in technical roles

2020: Recruitment of women overall and in technical roles

2020: Large company (>\$1bn revenue) recruitment of women overall and in technical roles


To be successful in the future, recruitment efforts need to focus on attracting and retaining all levels of women. Following are some ways this can be achieved:
| Feature women in leadership roles in recruitment campaigns. Research shows that the role models women see actually influence their perceptions of what they are capable of achieving.
| Institute training so that recruiters recognize the stereotypes they might unconsciously hold and make sure this bias is not an influence in the hiring process. According to Fast Company, recruiters are deeply committed to increasing diversity and inclusion, but they just don't know how to do it. As an example, recruiters often fail to present women in positions of power. As Fast Company highlighted, many companies either did not bother to send women from their own companies to recruitment sessions, or men treated the women colleagues with subtle gendered differences.
| Host diversity career fairs while showcasing women tech leaders in panels and in marketing materials

Ensure interview panels are diverse and inclusive of race, ethnicity, gender, and range of abilities
\| Invest in STEM programs to create greater opportunities for women in the workplace. This is a top priority cited by companies such as TSMC. According to Rick Cassidy, head of TSMC of North America, "It's easy to attract STEM students - unfortunately there just are not enough students in STEM.
| According to a report by the Kapor Center for Social Impac "The tech pipeline begins early, in elementary school, continues through higher education and extends into the workplace and entrepreneurship. There are leaks and barriers throughout the length of the pipeline that syphon off talent, particularly talent from underrepresented backgrounds."8

Incorporate checks and balances into the new hire process For example, ensure that there is diversity represented in the interview panel. One interviewee stated that they require two diverse candidates per slate (a qualified candidate). The diverse slate can be one woman and one diverse candidate or two women. If a woman does not get the job, the system looks for another role for which she might be qualified or applicable.
| Extend recruitment globally by outreaching to colleges and universities in other countries
\| Stay in touch with women and improve through lookback surveys. For example, in a 2019 interview with Synopsys CEO Aart de Gues, and Jan Collinson, Head of HR, they stated that Synopsys had connected with 150 women who were in technology and had since left the company over the past several years. They did this to determine what Synopsys could have done to retain them better.

Semiconductor companies are working hard to increase their pipeline of women in the workplace by partnering with organizations who promote women in technology such as Handshake, Fairy Godboss, Society of Women Engineers (SWE) and universities. According to Sun Kim at Inphi, "We're building partnerships with various women-led
rganizations specializing in placing candidates, such as Women Helping Women, SWE, Women in Technology (WITI), Grace Hopper, Women in Engineering (WIE (part of IEEE)), Women in Semiconductors (WiS). We're also working to be more active with engineering groups on campuses for women and minority women. Many of our partnerships re in their infancy; we're still working to build relationships. We've had some success, but still have a lot of room for improvement."

Other companies such as ON Semi and TSMC are trying to create a pipeline for talent by promoting STEM studies to the students in order to encourage women to go to technical universities. In fact, TSMC is aunching a "Girls in Semiconductor Tour" to encourage high schoo students to get into STEM.

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## Retaining and advancing women talent



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Attrition, as identified by many of the executives interviewed, is mainly at junior levels due to better opportunities and better caree goal alignment elsewhere. Executives interviewed felt that this was a result of women needing more work-life balance and also feeling unsupported by their manager.

All interviewees suggested that the attrition of women decreased the longer they stayed with the firm because with longevity often comes tenure and promotions. To improve attrition among all women many companies interviewed are engaging in more activities such as flexible work environments and better coaching of women in orde to retain them. Some of the other benefits and programs companies re employing to attract and retain women include mentoring circles, ERGs, revised parental leave policies, flexible work hours, STEM programs, and simply more exposure to opportunities.

Maria Merced, president of TSMC Europe explains this well by saying When you are able to raise your own bar, then you are really motivated. When you are happy with what you're doing, it's the best way of retaining people."
Following are some of the ways semiconductor companies can help ower the attrition of women in their organizations. These involve updating corporate benefits, programs and initiatives to be more appealing to women and to drive retention.
| Implement programs that allow women to take credit and ownership for their inventions. For example, companies such as Micron Technologies have employed the use of a genderdiversity innovation toolkit ${ }^{9}$ for employers to help women esearchers secure patentable discoveries. ${ }^{10}$
| Provide fertility programs that help recruit and retain top talent. According to Fertility IQ, more than $32 \%$ of employees say that they will stay with a company longer if that company offers a ertility benefit.1" Intel contributes up to $\$ 40,000$ for employees fertility treatments ${ }^{12}$, along with another $\$ 20,000$ for prescription coverage. The company also opened the benefit to employees regardless of infertility. ${ }^{13}$
| Offer stimulating opportunities through mentorship, sponsorship and other programs.
| Support women's technical conferences such as SWE, Grace Hopper, Glam and WISE. This could include encouraging women employees to attend, sponsoring these conferences and events, or helping to promote via social media and other communications vehicles.
| Provide flexibility to help women achieve better work-life balance This could include benefits such as working from home and flexible hourly schedules. According to Serena Townsend, vice president of HR Business Partners at Silicon Labs, "Flexibility is key. At Silicon Labs we offer parental leave, support working hour flexibility to balance home and family needs, and provide dedicated nursing rooms and pregnancy parking spots. We also provide back-up child care benefits in some countries to support our working parents."14

Another important requirement for retaining and advancing women is to create a thriving friendly corporate culture so women are not deterred from taking on a certain project or job. This culture should foster a collaborative environment that appeals to women who are socialized to value teamwork and generosity. Women must also be empowered to find success in their career by learning how to match their passion with their purpose, which has been described by Morten Hansen. According to Hansen, "There is actually a BIG difference between passion and purpose. Passion is "do what you love," whereas purpose is "do what contributes. Passion asks, what can the world give to you (a hedonistic inclination). Purpose asks, what can you give to the world (an other-orientation)."

It is important to remember that women, like most employees, can be discouraged if the environment isn't inclusive and challenging, even when they have the education, experience and talent. According to Maria Merced at TSMC "When you motivate with the career path in mind and the way you're learning, improving and developing, the success of retention is very high. We focus on training to keep the people motivated."

## Promoting and advancing women

survey results show that large companies tend to promote more women. Of the companies surveyed in 2020, half reported $20 \%$ or more women are in their total workforce, but less than 10\% are in director positions or above As depicted in the graph below, the median for representation of women in the total workforce lies in the 20-25\% range. This representation falls to under 10\% as roles progress from individual contributors to managers to board-level roles

This problem has only been compounded by the COVID-19 pandemic with CNBC reporting that working mothers are being disproportionately affected by the coronavirus pandemic and experts fear it could have a significant impact on their financial future. This article cites an August study by software company Qualtrics and theBoardlist that says that $34 \%$ of men working remotely with children at home said they received a promotion, versus $9 \%$ of women in the same situation. ${ }^{15}$

As job levels ascend, representation of women falls below $5 \%$. The research also shows that companies that are start-ups or smaller in size have more women on their boards as compared to those bigger in size.

2020: Women representation in company workforce by level


Similarly, women account for less than 10\% of the technical total workforce in almost half of the surveyed companies
Reasons cited in the interviews for these low numbers of women in the technical workforce include the following:
| Most executives surveyed agree that women in technical fields are in high demand. However, they claimed that there was an imbalance in the supply-demand ratio. There is a dearth of skilled women in this regard, and the competition is quite high.

I Promotions naturally come with more of a managerial/supervisory role. As a result, while technical women may move into business roles easily, the reverse is not necessarily true.
| Women are leaving technical roles because of cultural pressures on them as primary caregivers, thereby seeking work-life balance and more flexibility.

I Women feel unsupported in technical roles and do not feel supported by their managers.
\| Women are more likely to put their personal passion into purpose and feel that a technical role does not accomplish that objective.
| Not many companies have implemented successful ways to identify the enablers for engagement, retention and advancement of women in their jobs and workplace. One stand out company that does this quite well is Qualcomm. They have regular pulse surveys that identify the engagement of men and women leading to promotions, as well as training surveys that track and engage diverse groups in trainings. They also keep track of promotion velocity statistics and perform exit interviews and recruitment surveys.

2020: Women representation in technical workforce


When compared to 2019, the 2020 results showed that the share of companies with very few ( $<10 \%$ ) women has decreased for non-manager positions. In addition, for tech roles, the share of companies with very few (<10\%) women has decreased across most levels year-over-year while remaining flat for VP roles

According to one interviewee, "We want to make sure promotion rates are in line with representation and that women are ready to be promoted. We also partner with colleges for executive education and an online program for executive women in leadership.'

While survey interviews found that promotion metrics are in place by companies such as Qualcomm and Inphi, most companies do not employ any women advancement targets to encourage the promotion of women. Most executives interviewed specified that their companies track executive representation to make sure promotion rates are in line with diversity. They also want to make sure that women are ready to be promoted when the opportunities arise for them to advance.

As one interviewee claimed, "It really takes a bold leader to say 'l'm going to put her in that role and I'm going to help her.'"

Larger companies are also leveraging training and coaching programs All of the companies interviewed currently have these programs in place in order to ensure development of women in their roles. some companies are ensuring that women get more opportunities for exposure through participation at conferences and speaking engagements. Others focus on training managers to take the development of their people more seriously.

2019: Women representation in technical workforce of large companies (>\$1Bn in revenue)


2020: Women representation in technical workforce of large companies (>\$1Bn in revenue)

## Education is the great equalizer



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Education is the great equalizer and is needed to level the playing field for women and men in the semiconductor industry. Many top business schools such as USC Marshall School of Business, Stanford and Berkeley are revamping their programs to appeal to women. Examples of some of these new programs include virtual learning courses as well as sharing circles and coffee chats outside of the classroom to drive comradery among women students. According to a US News \& World Report, ${ }^{16}$ women are dominating online courses because they are very accessible and enable them to more easily maintain their work-life balance. Education, particularly in technical roles, can significantly improve the confidence factor in women. According to the Harvard Business Review, ${ }^{17}$ many women won't apply for jobs if they feel they are not $100 \%$ qualified. In fact, Fast Company reports that many qualified women are falling through the cracks: While $40 \%$ of men with STEM college degrees work in their field, only $26 \%$ of women do. To help combat this, the article recommends making sure that recruiters only list job qualifications that are truly necessary to perform the job successfully. "Often times listing too many qualifications can discourage women more than men. ${ }^{118}$

## Programs and benefits

Fortunately, the number of programs companies offer women continues to increase year over year. Clearly, companies are realizing the importance of professional development and they have started implementing programs.

As the graph to the right shows, maternity leave continues to be the top program offered in both years of the research study followed by leave of absence, telecommuting, paid paternity leave and professional development and training, tuition reimbursement and mentorship. Larger companies tend to focus on professional development to build a pipeline of qualified women and to create programs to retain women once hired.


Telecommuting saw a large year-over-year increase from 2019 to 2020 due to the COVID-19 pandemic. COVID-19 caused a major shift in the landscape of work/life balance in both a good and bad way. While women were able to spend more time with their families, they also were challenged because many lost access to childcare during the workday. Huff Post refers to this as "child care shock" and states that it is causing burn out and driving women out of work because they are typically primary caregivers at home. This same article cites an October 2020 report from Leanln.Org, the women's advocacy group, that states that one in four professional women are considering leaving their jobs or downshifting their careers. This may be the reason that in September, 865,000 women left the labor force, compared to 216,000 men, according to the Labor Department. That's the highest number in history, with the exception of March, when lockdowns forced millions of men and women out of work. The percentage of women in the workforce, $55.6 \%$, is as low now as it was in $1986 .{ }^{19}$

When looking at larger companies, 90\% offer professional development training, mentorship and sponsorship programs. All executives interviewed discussed the need to provide maternity leave or revise their parental leave policy in order to make it more inclusive by encouraging both parents to take paternity/maternity leaves and helping with integration back into the workforce upon return. Another trend seen across most companies is flexible work programs such as flex hours, mobile and remote work

Consistent in all larger companies interviewed was the sponsorship programs and STEM programs offered for developing women in the workforce and building the pipeline for technical talent. A few companies such as TSMC mentioned that they also provide niche benefits such as fertility programs to women. According to Executive Benefit News, the six most commonly covered fertility treatments include IVF treatments, fertility medication, genetic testing to determine infertility, non-IVF fertility treatments, visits with counselors, and egg harvesting and freezing services. ${ }^{20}$

When looking at the global workforce, APAC leads in on-site childcare while EMEA leads in overall program offerings.

## APAC leads in on-site childcare while EMEA leads in overall program offerings



## Summary: The future of closing the gap



Among the surveyed companies, women make up 20-25\% of the total workforce in 2020. To reach parity, it is important for all companies to implement programs and instill corporate cultures that encourage closing the gap. Larger companies have made more progress in many areas and this can serve as a blueprint for other companies to follow. As these larger companies are demonstrating, the key to making progress in closing the gender gap revolves around four key areas:

I Recruitment of women starting at a young age to build a strong pipeline for the future.
| Retention of women in high-tech roles through strong and flexible benefits and programs such as mentorship, sponsorships, and professional development programs.
I Career advancement to ensure that women have access to the same opportunities as men.
I Education to level the playing field between men and women, ensuring women not only have the qualifications to pursue a certain job, but they also have the confidence that they can do it successfully.
It's time to let the spirit of Moore's Law live on in another way. This is a call to the semiconductor industry to adopt some of the best practices we highlighted in this paper to help double the number of women in leadership roles in the industry, double the capital dedicated to womenled start-ups and double the number of STEM-focused women joining the industry.

Checklist for enterprises to assess their women-friendly culture:
I Look inside your own company. Diversity can be seen in the numbers. What percentage of women do you have? What percentage are in director roles and above?
| Evaluate the onboarding process. According to Acheivers.com, if your goal is to recruit people who are innovative, competent and dedicated to your mission, then it's crucial to earn their loyalty and respect in the hiring and onboarding process. ${ }^{21}$
I Review your programs and benefits. Have these been updated to be more appealing to women?
| Do your benefits and programs provide flexibility to women to enable them to balance work/home life demands?
| Do you have programs such as mentorship and sponsorship?
\| Look for and eliminate gender biases in the organization. Recruiters and business leaders must be trained to recognize these. Workplace environments and employee collaboration must be monitored to recognize even subtle biases that may exist.
| Build your pipeline. You can't hire if you don't have qualified candidates to choose from. Programs at universities, participation in women's leadership organizations and continued investments in STEM can help.

I Offer career advancement opportunities to women. Are women regularly considered for promotions; before hiring have you looked internally to see if women could do the job you need to fill?

I Keep in touch with women after they are hired. When a woman leaves a company, it's too late to do anything about it. Companies
need to keep in touch with women after they are hired to see how they are doing and how they feel. They need to make sure women feel like they have the programs, benefits, training and opportunities they need to want to stay in the company.
I Build a culture that values women and their advancement. Actively create an inclusive environment where everyone feels like they belong.

## Check list for women to assess a company's culture

I What was your first impression during the interview? If you have the qualifications, did you feel they saw you as qualified?

I Are you confident you can do the job as required by the company?

I Does the company offer fair and good pay benefits?
I Does the company offer work/life balance?
I Do you love your job?
I Do you feel like you have a sense of purpose at work?
| Does your management support you as a woman?
I Are there opportunities for you to grow in the company?
\| Does your company offer training to broaden your expertise?
I Are their role models you can look up to such as women in leadership?
Contact GSA and Accenture to find out how you can improve in all of these areas.

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