ASIAN AMERICANS ADVANCING JUSTICE AAJC

Testimony of Jiny Kim
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Before the
United States House Subcommittee on Consumer Protection and Commerce
of the Committee on Energy and Commerce

Hearing on "Inclusion in Tech: How Diversity Benefits All Americans"
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Good morning, Chairwoman Schakowsky, Ranking Member McMorris Rodgers, and Members of the Subcommittee. Thank you for the opportunity to testify on the importance of diversity in the technology sector. My name is Jiny Kim, and I am the Vice President of Policy and Programs at Asian Americans Advancing Justice | AAJC, a national civil rights organization founded in 1991 that is dedicated to advancing the civil and human rights of Asian Americans, as well as building and promoting a fair and equitable society for all. To pursue our mission, we work with over 160 community partners across the country, as well as in coalition with other civil society organizations that represent diverse constituencies. In our technology work, we hold private sector entities accountable to ensure that communities of color are not left behind in the world of innovation and advancement.

With millions of jobs created each year by the tech industry, there is no reason anyone should be left behind. However, the case for diversity is more than just a moral one – there's a real economic advantage that must be recognized. While many technology companies have taken the important step of addressing their lack of racial and gender diversity in the tech sector by releasing annual updates on diversity, there is still little overall progress being made. Further, companies have yet to collectively build effective tools for retaining, recruiting, and promoting those employees from diverse backgrounds. What is more concerning is that the programs,

products, and services created by these companies not only reflect this lack of diversity, but also have a disproportionately negative impact on communities of color. Effective reform will take more than just hiring reform, but a strong collaboration with civil society organizations to change a deep-seated culture in tech companies.

THE ECONOMIC ARGUMENT FOR DIVERSITY

Beyond the moral reasoning behind hiring diverse staff and creating products without troubling impacts on communities of color, the economic reasoning behind diversity has been well-documented in numerous studies, including ones referenced in Open MIC's 2017 report on investing in racial diversity in tech, which I have included for your reference. In fact, companies in the top quartile in terms of racial diversity are thirty-five percent more likely to have financial returns higher than the national median in their industry. This is even more true for the tech sector where products are the result of creative collaboration, so any edge you can gain on creativity will be lucrative.

DIVERSITY DATA IN TECH COMPANIES: A CLOSER LOOK

The unfortunate reality is that the massive success of tech companies comes at the cost of excluding women and people of color not only from their employment listings, but also from positions of leadership. According to the U.S. Equal Employment Opportunity Commission's study of tech sector employment data in 2014, African Americans and Latinos are underrepresented in tech by sixteen-to-eighteen percentage points compared with their presence in the American labor force overall. While there is higher representation of Asians in the tech workforce, they are still underrepresented in non-technical roles compared to their presence in technical roles and they are disproportionately left out of C-suite positions. In fact, white

employees are represented at a higher rate in the tech sector's executives category: the same EEOC study referenced above showed an 83% representation of white employees as tech executives in technical positions.

Data released by the top five tech companies this past year reflect a similar trend. Facebook reported having representation by African Americans grow from 2% to 4%, while Microsoft reported an overall 0.1% growth of African American staff from 2017 to 2018. While Amazon reported 63% of their leadership representation to be white in 2017, Google reported in 2018 that their white leadership representation was 66.9%. Finally, Apple reported that their leadership representation of Latinos stayed the same from 2016 to 2017 – at 7%. These numbers are disappointing given the fact that tech companies have committed to recruiting diverse staff and leadership, as well as investing in pipeline programs for at least the past five years.

While the effort companies are making to provide transparency in their diversity data should be appreciated, there remain several issues in how that data is reported. For example, the Asian American and Pacific Islander community represents over fifty different ethnic groups and 100 languages and/or dialects. Yet, in reporting their data, companies fail to disaggregate the data, resulting in overlooking those groups that have a lack of educational attainment, higher rates of poverty, and larger populations with limited-English proficiency. When these groups are left out, those efforts by tech companies and other stakeholders to encourage recruitment from diverse communities or increase investment in STEM programs is incomplete. Finally, we are encouraged to see that some companies are specifically listing data for Native American, Native Hawaiian & other Pacific Islander communities, but this is still not a mainstream practice.

ISSUES WITH RECRUITMENT, PROMOTION, AND RETENTION

Not surprisingly, tech companies have developed digital tools to review the myriad of applicants who apply for positions in their companies. Similar tools are also used to assess qualifications for promotion within the company. The problem with this approach is that the ideal profile being used as a model applicant reflects a majority white culture and the resulting unconscious bias. Posted job listings also use racially or gender-conforming language to push a white, male cultural norm which is incorporated into the initial screening process. To address these issues, companies should avoid using racially or gendered-coded terminology, as well as implement anonymous hiring tools to screen candidates without seeing personally identifiable information that may indicate age, gender, or race. Finally, training hiring teams and committees to identify unconscious and interpersonal bias will help improve hiring outcomes.

Greater effort is also needed to retain employees of color and women. In research conducted by the Level Playing Field Institute (LPFI), young women of color perceived race-based stereotypes as much more ominous barriers than those based on gender. Additionally, a 2007 Corporate Leavers Survey conducted by LPFI showed that white women are 1.5 times more likely than white men to leave the workplace due to the cumulative effect of subtle biases. People of color, regardless of gender, leave at more than 3.5 times that rate solely due to unfairness.

Some tech companies have taken the important step of reporting attrition rates of employees from diverse backgrounds. We applaud this effort as one step towards understanding what mechanisms and environmental factors are needed to retain diverse staff and eventually place them in the leadership pipeline. Companies that focus on supporting their employees through mentorship programs and Employee Resource Groups are also taking critical steps

towards retaining employees.

BIAS AND DISCRIMINATION IN TECH PRODUCTS

It is a common understanding among civil society organizations that the prejudice, ignorance, and hate we combat in real life live in the digital space at the same level, if not a greater magnitude. Similarly, tech companies that foster a majority white male employee base simply feed their own biases into the machines they create. We see this often in the search results for popular search engines. For example, type in “Asian girls” or “Latina girls” into a search and what will come up will be explicit images or other mature suggestive content. Given the fact that these searches are driven by predictive technologies created by human beings, the results are troubling.

In the criminal justice system, we see other disturbing examples of algorithmic bias. When a popular algorithm designed to predict when and where crimes will take place was used by police in Oakland, California, the program repeatedly sent officers to neighborhoods with a high proportion of people from racial minority groups, regardless of the true crime rate in those areas. Courts have also begun using predictive software to sentence convicted individuals. ProPublica published an account of two individuals who separately committed shoplifting – one individual was African American and the other was white. When a sentencing algorithm was used to predict the likelihood of each committing a future crime, the African American individual was rated a higher risk, even though he had only committed misdemeanors as a juvenile prior to the current offense, while the white individual had been convicted of attempted armed robbery as an adult prior to the current offense. Two years later, the computer algorithm was proven wrong with only the white individual having committed a felony.

Algorithmic bias has also shown up in housing, an area that has a long history of discriminatory practices against communities of color. A University of California Berkeley study found that both online and face-to-face lenders charge higher interest rates to African American and Latino borrowers, earning 11 to 17 percent higher profits on such loans. The algorithm, in this instance, was able to determine which applicants might do less comparison shopping and accept higher-priced offerings by the lender. The result was a disproportionate impact on minorities applying for loans. There are many reasons why communities of color may shop around less. One reason may be that they live in areas with less access to a range of financial products.

The most alarming practice by technology companies is commercializing products that have clear algorithmic bias. Facial recognition technology has a long history of bias which notably came to the spotlight when an African American man in 2015 was shocked to find an album of his digital photos titled “Gorillas” in which the software categorized him and his friend as primates. Regardless of the controversy surrounding the incident, companies have still failed to take adequate action. A study published in February of last year by researchers from MIT Media Lab found that facial recognition algorithms designed by IBM, Microsoft, and Face++ had error rates of up to thirty-five percent higher when detecting the gender of darker-skinned women compared to lighter-skinned men. Now companies such as Microsoft and Amazon have begun engaging government entities on the sale of such products. While some companies have developed internal principles around the ethical use of artificial intelligence, we cannot underestimate a private company’s desire to edge out competition and maximize profit in any given sector.

THE ROLE OF CIVIL SOCIETY

There is a serious culture shift that must take place within these companies, and civil society, and specifically, civil rights organizations like Asian Americans Advancing Justice | AAJC have already begun to play their part in this long overdue change. For example, Facebook with its well-documented issues, is taking part in a civil rights audit where several civil rights groups, like The Leadership Conference on Civil and Human Rights, will provide feedback on areas ranging from social media ads to company culture. Other tech companies have begun engaging civil society on diversity and inclusion issues, even sharing diversity data before it is publicly released. We have also joined our civil society partners in advocating for diverse communities in all aspects of tech policy. Last week, this subcommittee heard from Ms. Brandi Collins-Dexter from Color of Change who referenced the letter sent to Congressional leaders by 40 advocacy groups urging leaders to put civil and human rights at the center of the digital privacy discourse. I've included that letter for your reference.

CONCLUSION

The tech sector has transformed the way we communicate and connect with one another. Technological tools, which were once a benefit to have, have now become a critical necessity. We must ensure that the development of these products, services, and experiences leave no one behind and do not harm communities of color. In order to do so, employees who create these innovative tools must reflect the diversity of the communities that companies seek to reach. Thank you for providing me with the opportunity to testify on this important subject. I look forward to answering your questions.

BREAKING THE MOLD

Investing in Racial Diversity in Tech

A Report for Investors
February 2017

www.openmic.org

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INTRODUCTION

For centuries, artists have used plaster molds to replicate sculptures. More recently, manufacturers have used rubber or plastic to create molds for countless products. A mold enables the creation of multiple replicas – a pattern is repeated, sometimes endlessly.

Breaking the Mold — the title of this paper — is an action that's usually not taken lightly. Yet that is the proposition before the U.S. tech industry as it contemplates its workforce in the 21st century.

Across the nation, around the world, advances in technology are the drivers of innovation, opportunities and prosperity. Tech companies spur productivity, make difficult tasks easier and improve lives. They create wealth and provide fulfillment not just for those with the bright ideas, but also for the well-paid workforces that turn the entrepreneurs' vision and prototypes into products.

Yet in a country with a population growing more diverse each day,[1] the U.S. tech community is monochromatic, a bastion of white, male privilege. People of color largely remain shut out of the tech industry.

It cannot go on this way.

The lack of racial diversity in the tech sector is a critical problem demanding investor attention.

Technology is too important and too embedded in our lives — from classrooms and cars to homes and hospitals — to leave so many behind when it comes to doing the stimulating work that makes all things digital possible. Our future will be evermore technology-driven. Research firm Gartner Inc. estimates that the number of new devices connected to the internet will more than triple to nearly 21 billion by 2020.[2]

A report prepared for the 2016 World Economic Forum calls this technological ascendance "the Fourth Industrial Revolution." Tech breakthroughs "are unleashing new economic and social dynamics that will need to be managed if the digital transformation of industries and societies are to deliver long-term and broad-based gains," it said. "A resilient digital economy also calls for new types of leadership, governance, and behaviors."[3]

The gatekeepers to power in the U.S. tech industry are almost exclusively white. The people who work for them are also disproportionately white. According to a 2016 report by Intel and Dalberg Global Development Advisors, almost two-thirds of tech workers are white.[4]

We already know that a racially diverse tech sector could translate into stronger financial performance for tech companies.

Intel and Dalberg found the tech sector "could generate an additional $300-$370Bn each year if the racial/ethnic diversity of tech companies' workforces reflected that of the talent pool."[5] McKinsey & Company has reported that companies in the top quartile in terms of racial diversity are 35 percent more likely to have financial returns higher than the national median in their industry.[6] This research complements multiple studies which conclude that gender diversity clearly improves corporate financial performance.[7,8,9]

THE FACTS:

+ Black people, Latinos and Native Americans are underrepresented in tech by 16-to-18 percentage points compared with their presence in the U.S. labor force overall.[10] Black people and Latinos each comprise just 5.3 percent of the Professionals[11] category in U.S. tech industry labor data.[12]

+ While Asians are represented at a higher rate in the tech workforce than the private sector overall, white people are 1½ times more likely than Asians to rise to an executive rank.[13]

+ Among people of color who do enter the industry, many report isolation, discrimination and toxic work environments that prompt them to take their talent else-where. People of color leave tech at more than 3.5 times the rate of white men.[14]

Yet tech companies' efforts to address the lack of racial diversity have not resulted in real change.

A growing number of U.S. tech companies have begun releasing annual updates on diversity. These releases typically are accompanied by statements promising change and describing new diversity-related efforts — to the tune of an estimated industry investment in diversity of up to $1.2 billion in the past five years, according to Intel/Dalberg.[15] Often, investment comes in the form of money and resources poured into diversifying tech talent pipeline programs at nonprofits and universities. Many companies also have implemented staff training in unconscious bias, as well as employee affinity groups based on race, ethnicity, gender, sexuality, or physical ability — while these are all worthwhile activities, additional efforts are needed to see real change.

Because despite these efforts, racial and ethnic minorities have made scant progress over the past 15 years, securing only 1 to 2 percentage points more of the available jobs.[16]

At the top, doors are shut to most people of color. Only 2 percent of tech executives are black and 3 percent are Latino.[17]

Diversity is not simply about filling seats at the table. It's also about the decisions that get made at the table. A racially diverse tech industry helps ensure that the products and services the industry produces meet the diverse needs of the millions of Americans who depend on them. It also helps companies avoid perpetuating racial bias and discrimination, which pose legal, financial and reputational risks for them.

Racial diversity is about distributing power and resources equitably, within the industry — and beyond.

If the tech industry changed its hiring and promotion practices, the entire economy could benefit. Such a shift would "serve as a catalyst for achieving racial equity" across every industry,[18] argues CODE2040, a nonprofit that builds pathways to tech careers for black people and Latinos. In the context of a growing affluence gap in the U.S. — in three decades, the average wealth of white families has grown by 84 percent, 1.2 times the rate for Latino families and three times the rate for black families[19] — increasing opportunities for people of color in one of the fastest-growing and highest-paying sectors is a critical step toward redistributing economic opportunity across the economy.

While there is no "quick fix," there are opportunities for bolder interventions. Among the major recommendations discussed in this report:

+ Collecting and publicly disclosing more detailed industry data on demographics (including aggregated gender and race statistics);
+ Developing and publicly disclosing time-bound goals, with built-in accountability mechanisms;
+ Linking employee compensation and incentives to the achievement of goals, especially for senior leadership staff; and
+ Engaging white executives to make change.

There is substantial evidence that diversity leads to stronger economic gains for companies, no matter the industry. Given the digital world's burgeoning social and economic influence, the current lack of racial diversity in the tech industry poses serious risks for investors, the tech sector and society at large. *Breaking the Mold* aims to give shareholders the facts they need to convince tech companies to take new approaches on racial diversity.

In addition to underlining the already well-founded business case for racial diversity, this report will review the systemic problem of racial bias in tech; the failure of existing efforts to effectively address the problem; and the powerful role of investors in holding tech companies accountable for real change.

OPEN MIC *IS A NONPROFIT ORGANIZATION THAT WORKS TO FOSTER VIBRANT AND DIVERSE MEDIA THROUGH MARKET-BASED SOLUTIONS. OUR PRIMARY TOOL IS SHAREHOLDER ENGAGEMENT. WE AIM TO DEPLOY THE COLLECTIVE POWER OF INVESTMENT MANAGEMENT AND ADVISORY FIRMS, MUTUAL FUND COMPANIES, FOUNDATIONS, PENSION FUNDS AND ADVOCACY GROUPS TO HELP SHAPE CORPORATE MEDIA POLICIES AND PRACTICES.*

A NOTE ON TERMINOLOGY

What is the tech industry? What defines a tech company? Which jobs are tech jobs?

This report focuses on increasing racial diversity in both technical and non-technical jobs primarily at publicly traded information technology companies[20] – in other words, companies involved in IT; internet software and services; communications equipment; data processing; technology distribution; and related services.

However, many high-tech companies – and many high-tech jobs – fall under a broader definition. Companies in the telecommunications, health care and utilities industries, for example, also rely greatly on technology and technical jobs.

The 2016 *Diversity in High Tech*[21] report by the U.S. Equal Employment Opportunity Commission (EEOC), which is cited throughout this report, defines the high-tech sector as comprising "industries that employ a high concentration of employees in science, technology, engineering and mathematics (STEM) occupations and the production of goods and services advancing the use of electronic and computer-based production methods." The EEOC definition considers an industry high-tech if "technology-oriented workers" account for at least one-quarter of the total jobs within the industry. The EEOC findings are based on 2014 EEO-1 reports filed by private U.S. companies within these high-tech industries.

Intel and Dalberg Global Development Advisors, whose research on the economic value of racial and gender diversity in tech is also cited throughout this report, conducted an analysis of almost 170 U.S. based tech companies and applied the results to the nearly 500 domestic-tech companies listed on the NASDAQ[22] to estimate industry-wide economic effects of diversity on revenues, market value and operating margin. The NASDAQ Composite index includes shares of firms specializing in computer services, internet services, software and hardware manufacturing and distribution, office equipment manufacturers and distributers, semiconductors and telecommunications equipment.

RACIAL BIAS:
A SYSTEMIC PROBLEM

Racial diversity requires an explicit focus from investors and companies.

Many tech companies have begun to disclose the breakdown of their employees by gender and race. As a result, we have more than enough evidence showing that the industry is vastly and disproportionately composed of white men. Gender bias and racial bias are fundamental issues for these companies to address.

"WHILE 78 PERCENT OF COMPANIES REPORT GENDER DIVERSITY IS A TOP PRIORITY, ONLY 55 PERCENT REPORT THAT RACIAL DIVERSITY IS."

— *Women in the Workplace 2016*, a report by LeanIn.Org and McKinsey & Company

The issue of inadequate racial diversity, however, often takes a back seat to discussion of inadequate gender diversity.

This report specifically focuses on increasing the representation of people of color in tech for three reasons:

+ Racial diversity significantly strengthens economic outcomes for tech companies and tech investors.
+ Racial diversity in the fastest-growing industry is critical to expanding economic opportunities for communities of color. Less social inequality leads to a stronger economy for all.[23]
+ People of color in leadership and decision making roles at all levels can help ensure that the products and services built by the tech industry: 1) meet the needs of a diverse consumer base; and 2) do not perpetuate existing forms of racial bias and discrimination, which pose legal, financial and reputational risks for companies.

A LeanIn.org/McKinsey & Company report on working women noted, "While 78 percent of companies report gender diversity is a top priority, only 55 percent report that racial diversity is."[24]

Does it have to be this way?

In a word, no.

Because racial bias is a systemic problem, it works against people of color every step of the way, from the talent pipeline to the board of directors.

Although some improvement has been made to representation in the tech pipeline[25] — thanks in part to effort and expense that tech companies have devoted to opening the spigot — this improvement is not yet reflected in companies' workforces.

In its 2016 EEOC filing, for example, Facebook reported 4 percent of its staff is Latino and 2 percent black, unchanged from a year earlier.[26] Google's workforce is 3 percent Latino and 2 percent black, also unchanged despite an increase in the percentage of the company's new hires of color.[27] Although Asians are overrepresented in tech compared with their proportion in the private sector overall — as are white people — research shows Asians remain affected by harmful workplace cultures, inaccurate stereotypes and exclusion from leadership opportunities. An Ascend Foundation study found that Asians are "severely under-represented at the executive levels."[28]

> *"DIVERSITY OF GENDER AND RACE IS NOT A SERIOUS FOCUS IN SILICON VALLEY. . . . IF SILICON VALLEY WANTED TO SOLVE THIS ISSUE, IT WOULD BE SOLVED."*
>
> — Shellye Archambeau, CEO, MetricStream

RACIAL DIVERSITY OF U.S. WORKFORCE AT MAJOR U.S. TECH COMPANIES

Source: Based on corporate filings with the U.S. EEOC and most-recent available company diversity disclosures at the time of publication (see links). Percentages are rounded.

Company	White	Black	Asian	Latino	Other*
Adobe	69%	2%	24%	4%	1%
Airbnb	57%	3%	30%	7%	4%
Amazon**	52%	18%	13%	13%	5%
Apple***	56%	9%	19%	12%	3%
Atlassian	73%	2%	15%	2%	4%
Cisco	55%	3%	36%	5%	<2%
Dropbox	57%	3%	30%	6%	4%
eBay and PayPal	60%	8%	25%	5%	2%
Facebook	52%	2%	38%	4%	4%
Google	59%	2%	32%	3%	<4%
HP Inc. & HPE (formerly HP)	71%	7%	14%	6%	<2%
Intel	51%	4%	36%	8%	<2%
LinkedIn	54%	3%	36%	5%	<3%
Microsoft	58%	4%	31%	6%	<3%
Oracle****					
Pandora	65%	5%	16%	8%	7%
Pinterest	49%	2%	41%	4%	4%
Salesforce	65%	2%	24%	4%	<5%
Sandisk	44%	1%	50%	4%	1%
Slack	63%	4%	23%	5%	5%
Twitter	57%	3%	32%	4%	<4%
Yahoo	45%	2%	44%	4%	5%
Yelp	63%	7%	14%	9%	7%

**Companies determine how they disclose their data. The categories above reflect commonly reported racial categories: white, black, Asian and Latino. "Other" indicates additional categories reported on by companies, including but not limited to: Native American, Native Hawaiian/Pacific Islander, Alaska Native or multiracial. Most companies do not aggregate gender and race data.*

*** A note on the relatively high percentage of employees of color at Amazon: According to a report on Amazon by the Institute for Local Self Reliance, "Amazon [warehouse worker] wages were an average of 15 percent below the wages for comparable positions. ... These low wages disproportionately affect African-American and Latino workers, who comprise 45 percent of Amazon's warehouse workforce, but only 8 percent of the company's management."* [29]

**** Apple's retail employee base is included in its overall numbers. In 2014, Apple had about 66,000 employees in the U.S., including 30,000 U.S. retail employees.*[30] *According to the company's latest disclosure, the retail staff is more racially diverse than the staff overall. Meanwhile, the tech staff is less racially diverse than the staff overall.*

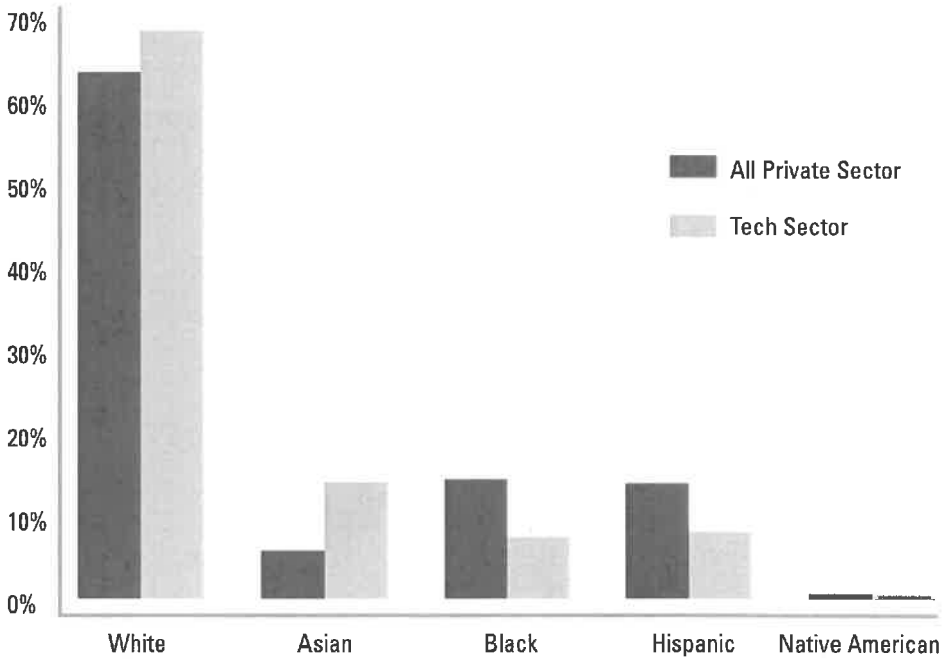
***** Oracle does not publicly break out percentages of white, black or African-American, Asian, Hispanic or Latino staff employed by the company. Oracle's disclosure states that employees include 37% minority staff and 29% women staff.*

Under pressure from diversity advocates, watchdogs and investors, many tech companies have taken the critical first step of publicly disclosing the racial makeup of their staff and leadership. Beyond increasing transparency, they are striving to change company cultures, implement anti-bias training and require racially diverse candidate pools. These are important steps toward change.

More than a dozen big, publicly held tech companies now disclose annually the employee diversity data that the U.S. Equal Employment Opportunity Commission (EEOC) requires. These "EEO-1 reports" include information about the gender and race of staff, broken down by job categories delineated by the government. Notably among these well-known companies, IBM has not disclosed its EEO-1.

The table below is based on an EEOC analysis of 2014 employee demographic data from major U.S. tech-sector companies.

Workforce Diversity by Race: U.S. Tech Sector versus All Private Sector Industries



Source: EEOC, 2014 Nationwide EEO-1 Data

In the San Francisco Bay area's tech landscape, black people and Latinos had "negligible employment representation" in 2014, according to the EEOC.

An analysis by PolicyLink, a national research institute working to advance economic and social equity, and the University of Southern California's Program for Environmental and Regional Equity warned that "while the Bay Area economy is booming, rising inequality, stagnant wages, and persistent racial inequities place its long-term economic future at risk."[31]

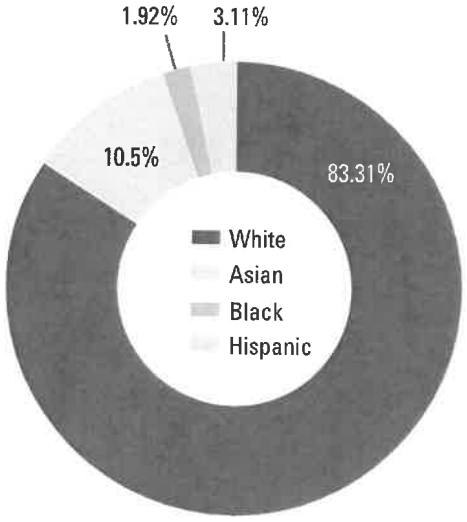
"Diversity of gender and race is not a serious focus in Silicon Valley," says Shellye Archambeau, CEO of MetricStream. "We have the smartest, most innovative and courageous workforce in the world. If Silicon Valley wanted to solve this issue, it would be solved."[32]

Racial inequity pervades the industry's policies and norms. People of color are promoted less and paid less.[33]

People of color are largely excluded from leadership positions in tech. White hands remain firmly gripped on the levers of power.

For example, fewer than 1 percent of Silicon Valley executives and managers are black, according to the EEOC.

U.S. Tech Sector Executives by Race



Source: EEOC, 2014 Nationwide EEO-1 Data

Changes in the makeup of senior management lag those in the broader workforce. At Apple, 27 percent of the company's latest U.S. hires were from underrepresented racial and ethnic groups, yet only 7 percent of the leadership is Latino and 3 percent black.[34] Only 5 out of Apple's top 107 executives are black, Latino, Native American or Hawaiian/Pacific Islander.[35]

The disparity in access to leadership carries through to unequal pay across non-management positions. The American Institute for Economic Research found that in 2014 people of color were paid less than white people for the same tech jobs.[36]

FOR PEOPLE OF COLOR, THE "RIGHT" EDUCATION AND CREDENTIALS ARE NO GUARANTEE OF A JOB. AT THE SAME TIME COMPANIES WORK TO ADDRESS BIAS IN THE TALENT PIPELINE, THEY CAN ADDRESS BIAS IN THEIR OWN RANKS.

In response to low levels of racial diversity, companies often point to the need to diversify the talent pipeline. But statistics show the pipeline isn't the only problem.

Google, for example, has placed engineers at a handful of Historically Black Colleges and Universities (HBCUs) to teach computer science and to coach students on applying and interviewing for tech jobs. In 2015, the company donated $775,000 to CODE2040 for its work to increase representation of black people and Latinos in tech.

Yet, while black people and Latinos now earn nearly 18 percent of computer science bachelor's degrees,[37] they hold barely 5 percent of tech jobs. Over the past decade, black, Native American and Latino enrollment in science, technology, engineering and math (STEM) graduate programs has increased by 50 to 65 percent. Meanwhile, the EEOC reports that jobs in computer science and engineering are growing at twice the rate of national employment levels.[38]

Tech companies must do better at hiring people of color in technical roles. At the same time, there is no justification for the lack of diversity in non-technical roles. From lawyers and public relations staff to sales and marketing employees, a range of well-paid roles are required to keep a tech company alive and well. Just as companies in the public sector overall have managed to increase diversity across a variety of job functions, there is no reason tech companies can't do the same. For people of color, the "right" education and credentials are no guarantee of a job. At the same time companies work to address bias in the talent pipeline, they can address bias in their own ranks.

Poor retention is a big part of the problem. Stereotypes and racial bias run deep.

Women and people of color encounter negative workplace experiences far more often than their male and white counterparts.

> *"THE ADVANCEMENT OF WHITE WOMEN IN THE PRIVATE SECTOR HAS ECLIPSED THAT OF PEOPLE OF COLOR, REGARDLESS OF GENDER. WHITE WOMEN HAVE BEEN THE LARGEST BENEFICIARIES OF WORKPLACE AFFIRMATIVE ACTION PROGRAMS."*[39]
>
> — *Freada Kapor Klein, Partner, Kapor Center for Social Impact*

A Level Playing Field Institute (LPFI) study of tech employees found that "white women are 1½ times more likely than white men to leave the workplace due to the cumulative effect of subtle biases. People of color, regardless of gender, leave at more than 3½ times that rate solely due to unfairness."[40] A separate LPFI survey found that people of color were least satisfied with their job and skill development opportunities in this sector and most likely to leave the company in the upcoming year.[41]

"Gender and racial bias is so ubiquitous in the technology industry that it forces talented female and minority employees to leave,"[42] says Bonnie Marcus, an executive coach for women.

Retention and job satisfaction are critical issues to address for investors seeking to diversify tech. These factors matter because the steady loss of employees of color imposes significant costs for companies. Sage HRMS, a human resources management company, cites a replacement cost to a company for replacing a midlevel employee of 1½ times the employee's yearly salary, and four times the annual salary for a high-level or highly specialized employee.[43] As a result, according to LPFI, U.S. companies shell out $64 billion each year for burdensome turnover.[44]

Women of color face unique and additional barriers.

All women are underrepresented in the tech workforce, but black, Latina and Native American women lead this deficit.

Venture capitalist Freada Kapor Klein, partner at the Kapor Center for Social Impact, agrees: "The advancement of white women in the private sector has eclipsed that of people of color, regardless of gender. White women have been the largest beneficiaries of workplace affirmative action programs."[45]

Intel reported that the company reached its 2016 goal of ensuring that 45 percent of its new hires were women or underrepresented minorities. However, only 13 percent of the year's new hires were racial or ethnic minorities, and overall representation of underrepresented people of color in the company remained at 12.3%, compared with 12.4% from the year before.[46] Similarly, Slack Technologies, a fast-growing business collaboration software startup, disclosed that while representation of women on its staff jumped to 44 percent from 39 percent in half a year, the percentage of black staff actually dropped to 3.4 percent from 4 percent.[47]

> *"WE FOUND THAT THERE'S AN UNBELIEVABLE AMOUNT OF TALENT BEING PASSED OVER WITH THE IDEA THAT THERE'S A TALENT CRISIS WHEN, ACTUALLY, THERE [IS] AN OPPORTUNITY CRISIS."*
>
> — *Rev. Jesse Jackson, President, Rainbow PUSH Coalition*

According to the National Center for Women & Information Technology, women hold 25 percent of all computing jobs, yet black women hold only 3 percent and Latinas 1 percent of these roles.[48]

As a result of marginalization because of both gender and race, women of color are blocked not only from opportunities in hiring and earning promotions, but also from benefiting from the broader world of tech investing. Digital Undivided, a group working to empower women of color entrepreneurs, has found that although 80 percent of new, woman-led businesses are founded by black women and Latinas, only 0.2 percent of these projects receive venture capital (VC) funding. "[Black-women-owned] businesses generate over $44 billion a year in revenue. Yet in the tech world, investors aren't taking a risk on startups run by black women," Davey Alba wrote in *Wired*.[49] Indeed, Intel and Dalberg report that black people and Latinos make up less than 1 percent of venture-backed tech company leaders.[50]

The lack of racial diversity in the tech industry is a *persistent* problem, not a new one. Why?

According to Rev. Jesse Jackson of the Rainbow PUSH Coalition, "there's an unbelievable amount of talent being passed over with the idea that there's a talent crisis when, actually, there [is] an opportunity crisis."[51]

One explanation for the disparity between available candidates and their representation in the workforce: implicit or unconscious bias among the mostly white men who call the shots.

> *"I HAVEN'T EVEN STARTED MY FIRST FULL-TIME JOB YET AND I'M ALREADY SO TIRED OF FEELING ERASED AND MISTREATED BY THE TECH INDUSTRY. ... WHAT MORE MUST STUDENTS OF COLOR DO TO MAKE IT CLEAR THAT WE ARE QUALIFIED TO BE IN THIS INDUSTRY?"*
>
> — *Kaya Thomas, Computer Science Major, Dartmouth College*

A 2016 report by the Silicon Valley Community Foundation on disrupting bias in tech found that "[h]idden or inherent biases mean that organizations may fail to reward workers equally, disfavoring employees who are women or from ethnic groups traditionally underrepresented in the tech sector, including Black people and Latinos."[52]

According to the Kirwan Institute for the Study of Race and Ethnicity, these deep-seated biases, "are activated involuntarily and without an individual's awareness or intentional control."[53]

Research has demonstrated the negative impact of hidden bias in all kinds of professional contexts — especially hiring. Resumes with "typically white" names receive 50 percent more callbacks than resumes with "typically black" names. "Typically white"-named candidates who were only average in qualifications received more callbacks than highly skilled job seekers with "typically black" names.[54]

Importantly, many companies are implementing anti-bias training to help staff identify and address unconscious racial bias in the workplace. In the past, companies working to increase diversity have often relied on "diversity trainings", which do not necessarily include a focus on systemic bias. However, it is not clear that all diversity training works. One study found that "[p]rograms that target managerial stereotyping through education and feedback (diversity training and diversity evaluations) are not followed by increases in diversity."[55] Moving forward, companies should work to assess the effectiveness of any form of training they implement for staff — whether anti-bias training or otherwise.

> *"WHEN THERE WAS ONLY ONE WOMAN OR MINORITY CANDIDATE IN A POOL OF FOUR FINALISTS, THEIR ODDS OF BEING HIRED WERE STATISTICALLY ZERO. . . . [BY] ADDING JUST ONE MORE WOMAN OR MINORITY CANDIDATE, THE DECISION MAKERS ACTUALLY CONSIDERED HIRING A WOMAN OR MINORITY CANDIDATE."*
>
> — Researchers describing their findings in the *Harvard Business Review*

Hiring and promotion practices often impede potential recruits.

Facebook has begun employing the "Rooney Rule" — the National Football League requirement that at least one candidate from an underrepresented group be considered for every head coaching or senior operations position — to ensure its candidate pools are diverse.[56] Rules alone, however, are no guarantee of change. Only one of 21 first-time NFL head coaches hired since 2012 is a person of color.[57]

Requiring one underrepresented candidate in the hiring pool may not be enough. University of Colorado researchers, writing in the *Harvard Business Review*, found that, "When there was only one woman or minority candidate in a pool of four finalists, their odds of being hired were statistically zero." For women candidates, there was a 79-fold increase in the odds when there were two female finalists. The odds of hiring an underrepresented candidate of color were 194 times greater when there were at least two underrepresented finalists of color.[58]

Language in tech-sector job listings often reinforces white, male cultural norms.

One young Dartmouth student engineer, Kaya Thomas, lamented: "According to most tech companies, if I can't pass an algorithmic challenge or if I'm not a 'culture fit' I don't belong. I haven't even started my first full-time job yet and I'm already so tired of feeling erased and mistreated by the tech industry. … What more must students of color do to make it clear that we are qualified to be in this industry?"[59]

To break the mold of who's considered a "good fit" for the tech sector, companies are taking steps such as:

+ Ensuring that both the hiring committee and the channels for finding candidates are diverse in terms of race, gender, class, age, location and ability.

+ Opting not to use racially or gender-coded terms like "rock star," "startup culture," "work hard, play hard" and "aggressive" in job postings in favor of terms such as "community," "respect" and "adaptable."

+ Implementing anonymous hiring tools that allow companies to screen candidates without being presented with personally identifying information such as name, graduation years, photos, etc.

+ Avoiding "whiteboard interviews," which have been called "behavioral screening[s] in disguise."[60] Candidates are often asked to recall algorithms from memory and under time pressure, triggering stereotype threat[61] for underrepresented candidates without testing actual job functions.

+ Asking every applicant the same interview questions.

Greater effort is required to retain employees of color once they've been hired.

Companies can do more to understand why people of color leave. CODE2040 found that black and Latino tech professionals consider leaving the industry the most when they experience a lack of social networks — with women of color and black men most likely to feel isolated or negatively affected by race in the industry.[62]

Mentorship is an important part of feeling supported at work, yet mentorship alone is not enough for people of color to be able to contribute to shaping the tech environment.

Employee Resource Groups (ERGs) bring employees together based on affinity around race, gender, physical ability, sexuality, nationality, and other identities. More often than not, these groups are developed for staff to connect and build networks around marginalized identities. However, systemic change requires action and participation from the dominant groups as well as those experiencing marginalization.

THE ROLE OF INVESTORS

Tech's influence on the U.S. economy may outstrip even its accelerating innovations and profits.

One reason investors should care about racial diversity is because it is good business.

Companies in the top quartile in terms of racial diversity are 35 percent more likely to have financial returns higher than the national median in their industry,

and companies in the top quartile for gender diversity are 15 percent more likely to earn more.[63] According to McKinsey, "racial and ethnic diversity has a stronger impact on financial performance in the United States than gender diversity, perhaps because earlier efforts to increase women's representation in the top levels of business have already yielded positive results."

> *"...[THE] SECTOR COULD GENERATE AN ADDITIONAL $300-$370BN EACH YEAR IF THE RACIAL/ETHNIC DIVERSITY OF TECH COMPANIES' WORKFORCES REFLECTED THAT OF THE TALENT POOL."*
>
> — *Finding from Intel and Dalberg Global Development Advisors*

The Intel/Dalberg report finds that if tech companies were racially representative, the industry could create $300 billion to $370 billion per year in additional revenue.[64] Using diversity data from almost 170 companies, the report demonstrates the tremendous economic opportunities delivered by increased diversity in the tech sector, including several key findings for investors (see box below). (For more information on the Intel/Dalberg report methodology, click here.)

Selected findings from Intel and Dalberg's *Decoding Diversity: The Financial and Economic Returns to Diversity in Tech*

+ "[E]very incremental percentage point in African American and Hispanic representation is linked with a three-percentage-point increase in revenues, meaning that the sector could generate an additional $300 – $370Bn each year if the racial/ethnic diversity of tech companies' workforces reflected that of the talent pool."

+ Tech companies in the top 10% of racial/ethnic diversity are roughly two-thirds more likely to produce higher revenues than those in the bottom 10%. Similarly, companies that lack racial/ethnic diversity are about 20% more likely to fall short of median operating margins.

+ "The estimated returns to racial/ethnic diversity could add as much as 15 – 20 percent to an early-stage startup's valuation, providing these companies with a longer runway to test ideas, innovate, and grow."

Source: Intel and Dalberg Global Development Advisors

Racial diversity is about the distribution of power. Increasing racial diversity in tech does more than increase the representation of people of color. It also distributes power and resources equitably, within the industry — and beyond — for a stronger economy.

In San Francisco, tech workers pull down $145,000 a year on average, including bonuses and stock options, compared with the $75,000 non-tech, private-sector workers there make. But tech firms in the Bay Area hire underrepresented people of color at lower rates than does the rest of the private sector.[65]

Tech companies are setting the standards and rules for society. Without people of color making decisions that shape these rules, companies risk perpetuating racial bias and discrimination, which harms consumers, damages business reputation and can lower profit.

> *"WHEN THE LIVED EXPERIENCE OF UNDERREPRESENTED COMMUNITIES IS OMITTED FROM THE PRODUCT DEVELOPMENT CYCLE, THE USEFULNESS OF THE TECHNOLOGY BECOMES BIASED TOWARDS ONE GROUP."*
>
> — Kapor Capital's *Founders Commitment*

Craig Federighi, Apple's senior vice president of Software Engineering, says, "We need as many perspectives as possible so we can build products that are universal."[66]

Yet tech companies are increasingly enmeshed in issues of racial discrimination or bias. Google has apologized after image recognition software developed for the company's Photos application identified black people in photographs as gorillas.[67] Airbnb has been sued for racial discrimination.[68] In a recent survey by Jopwell, a recruitment firm focused on diversity, nearly 40 percent of black, Latino and Native American tech engineers said that they had experienced workplace bias.[69]

At the same time, social media platforms such as Twitter, Facebook and Instagram provide a way for marginalized communities to share information and organize to call out racial injustice. But as citizens use tech platforms to capture footage of police killings of black people, for example, the role of determining how, when and whether to censor users' content remains under the tech companies' control.

Leslie Miley, a former Engineering Manager at Twitter, said of his time at the social media platform: "[There] were moments that caused me to question how and why a company whose product has been used as an agent of revolutionary social change did not reflect the diversity of thought, conversation, and people in its ranks."[70]

> *"MANY VCS DON'T SEEM TO CARE ABOUT THE PROBLEMS THEY CREATE, HOW FOUNDERS PERCEIVE THEM, AND THE LACK OF DIVERSITY IN FUNDING PRACTICES."*
>
> — Ellen Pao, *Investment Executive and Co-Founder, Project Include*

Kapor Capital, an Oakland, Calif., VC firm, with a commitment to workforce diversity and to leveraging technology to address urgent social needs, offers a trenchant diagnosis of the problem. "Today the tech industry does not look like America, and that has a significant influence on the types of products and services that get created," its *Founders' Commitment* states. "When the lived experience of underrepresented communities is omitted from the product development cycle, the usefulness of the technology becomes biased towards one group."[71]

Despite all the evidence demonstrating its benefits, many tech investors don't prioritize company diversity in their funding decisions.

What does investor commitment to racial diversity look like now?

More than half of investors in startups ranked "founder commitment to a diverse team as the least of their concerns when considering [whether] to invest," according to a 2016 survey by LinkedIn.[72] Forty-three percent of white male investors surveyed believed that the media spends "too much time talking about [diversity]," and 64 percent of white male investors think the tech industry faces "the same challenges as the broader workforce," despite the fact that the tech industry actually fares worse on diversity than the private sector generally.[73]

"Many VCs don't seem to care about the problems they create, how founders perceive them, and the lack of diversity in funding practices,"[74] says Ellen Pao, an investment executive and a co-founder of Project Include.

Although three out of four investors say their VC firms are not supporting efforts to improve diversity among founders in their portfolio, investors remain optimistic that within five years, "34% of their portfolio will consist of companies who are founded by racially diverse teams." Yet, studies show that U.S. VCs are more likely to invest in start-ups led by executives of their same ethnicity.[75]

Among investors in companies whose securities are publicly traded, there is nascent interest in diversity. In 2012, U.S. investors controlling $417 billion of assets said they considered diversity when making investment decisions; by 2014, that number had risen nearly 40 percent — to $578 billion, according to US SIF, a trade association.[76] In contrast, the total market capitalization of all U.S. publicly listed companies is more than $60 trillion.[77]

Moreover, neither companies nor investors have a shared definition of "diversity."

In 2016, then-U.S. Securities and Exchange Commission Chair Mary Jo White stated in her keynote address at the International Corporate Governance Network conference:

"[In] 2009, the [S.E.C] adopted a rule requiring companies to disclose whether, and if so, how their nominating committees consider diversity and, if they have a policy on diversity, how its effectiveness is assessed. The rule does not define diversity ... It left it to companies to say what they mean by diversity in their policies and disclosures. What has been the impact of our rule? Companies' disclosures on board diversity in reporting under our current requirements have generally been vague and have changed little since the rule was adopted. Very few companies have disclosed a formal diversity policy and, as a result, there is very little disclosure on how companies are assessing the effectiveness of their policies. Companies' definitions of diversity differ greatly, bringing in life and work experience, living abroad, relevant expertise and sometimes race, gender, ethnicity, and sexual orientation. But these more specific disclosures are rare and, not surprisingly, there are investors who are not satisfied."[78]

SOME INVESTORS ARE REQUESTING MORE SPECIFIC DIVERSITY POLICIES AND PRACTICES AT COMPANIES.

+ In 2015, Arjuna Capital began asking tech giants to disclose the wages of their employees broken down by gender. A new EEOC requirement for larger companies to disclose employee compensation data, starting with 2017 EEO-1 reports, should shed more light on pay inequities.

+ In 2016, Trillium Asset Management withdrew workforce diversity shareholder proposals at Adobe and Citrix after both companies committed to publishing annual EEO-1 workforce diversity data and to disclosing details about strategies and plans to attract and retain women and underrepresented people of color.[79] Citrix specifically agreed to set diversity and inclusion goals with deadlines by the end of 2016.[80]

+ In May 2016, New York City Comptroller Scott Stringer unveiled new governance principles and proxy voting guidelines for the New York City Pension Fund to focus on board diversity, among other criteria — and include a focus on racial diversity, gender diversity and increased representation among LGBT people.[81]

+ In 2015, Apple shareholder Tony Maldonado submitted a proposal asking the company to adopt an "accelerated recruitment policy" to increase representation of people of color among Apple's leadership. The proposal garnered widespread media coverage and won 5.1 percent of the shareholder vote. Mr. Maldonado and co-filer Zevin Asset Management have filed a similar proposal for consideration at Apple's 2017 annual meeting.

+ After *Black Enterprise* in 2014 published a "list of shame" of tech companies without a single black director,[82] the Nathan Cummings Foundation prodded 13 tech companies to improve the racial diversity of their boards. It also asked them to devise plans to broaden black representation in each company's "contractor relationships and the workforce more broadly." By 2016, only three of the targeted companies had appointed a black person to their corporate board.

Strengthening Data Disclosures

For investors, disclosure and transparency by companies are often critical to identifying the changes that must occur there. But such openness is still limited.

One limitation is the overall lack of data aggregated by gender and race. With current disclosures, it is difficult to answer more complex questions such as: How are women of color faring compared with white women, or compared with men of color? Software startup Slack in 2015 found that only 9 percent of U.S. engineering organizations publicly reported the intersection of race and gender in staff diversity reports.

Disclosure is also often limited by the lack of information given to investors about the kinds of jobs held by people of color in the company. For example, the chart on page 10 of this report shows that a relatively high proportion (18 percent) of Amazon employees identify as black or African American. But Amazon's U.S. employees of color are often found in underpaying warehouse jobs with poor benefits, rather than in tech jobs that pay well and offer good benefits. The Institute for Local Self Reliance found that "Amazon [warehouse workforce] wages were an average of 15 percent below the wages for comparable positions" in other similar warehouse jobs, and that "these low wages disproportionately affect African-American and Latino workers, who comprise 45 percent of Amazon's warehouse workforce, but only 8 percent of the company's management."[83]

RECOMMENDATIONS

While there's no quick fix to the problem, experts and advocates say companies would benefit from more focused strategies. These four are at the top of the list:

+ **COLLECT AND DISCLOSE MORE DETAILED DATA** on the workforce, filtered by demographics (both gender and race, aggregated) to help display the specific challenges each company faces related to race and equity. As with any other business challenge, tracking a comprehensive set of metrics can help companies understand whether the efforts in place to address the problem are working, and where additional efforts are needed.

+ **DEVELOP AND PUBLICLY DISCLOSE TIME-BOUND GOALS** for racial diversity to ensure that tech companies not only make public commitments — they also produce timely outcomes that reflect those commitments.

+ **LINK EXECUTIVE COMPENSATION AND EMPLOYEE INCENTIVES TO THE ACHIEVEMENT OF GOALS** related to increasing racial diversity, as one way of instilling accountability.

+ **ENGAGE WHITE EMPLOYEES — ESPECIALLY EXECUTIVES — IN MAKING CHANGE** to help ensure that the responsibility to increase racial diversity falls on those who currently hold the most power and influence, rather than on the tech professionals of color who are most directly affected.

Collecting and Disclosing More Detailed Data

Publicly disclosing the EEO-1 form, which gathers information about the race and gender composition of a company's workforce, is a good place to start. What we measure, we improve. Some additional suggested demographic metrics from Project Include are featured in the box below:

PROJECT INCLUDE'S RECOMMENDATION: MEASURING PROGRESS

Project Include recommends that tech companies collect data, cut by demographics, on:

+ Employees overall, by function, seniority and tenure
+ Employee status (full-time / part-time / contractor)

+ Management and leadership
    - Employees reporting to female managers
    - Employees reporting to managers from under-represented groups

+ Salary
    - Raises and bonuses

+ Equity, all-time and 12 months trailing
    - Employee equity pool, all-time and 12 months trailing, by gender and race
    - Investor equity pool, by gender and race
    - Vesting rates, by gender and race

+ Board of Directors
+ Candidate pools and hiring funnels, by role
+ Voluntary and involuntary attrition rates
+ Promotion rates
+ Complaints (formal and informal)
+ Complaint resolution status[84]

Tech companies such as Amazon, Apple, Facebook and Microsoft have begun to disclose employee salaries, broken down by gender and sometimes but not always by race.[85] The salary data does not reflect total compensation, including bonuses and stock options. In a keynote address at the 2016 Human Capital Management Summit, Cyrus Mehri, a partner of Mehri & Skalet, a law firm specializing in class actions, urged the SEC to require that companies disclose the top 200 highest-paid executives' total compensation by race, ethnicity and gender.[86]

Linking Time-Bound Goals with Accountability Mechanisms

Kimberly Bryant, founder of Black Girls Code, expands on the notion that goals may look different depending on the context: "If companies build for diversity from the beginning from the ground up, that's definitely the ideal... But if you're a more mature company that's been around for 10 years, 20 years, 30 years, and you're still having diversity issues, I think a more targeted effort that may involve setting a quota or number for the number of hires you're going to attract over a period of time is a good solution. I don't think quotas are necessarily an evil."[87] Dozens of companies have signed the Obama White House's Tech Inclusion Pledge, which holds them to "implement and publish company-specific goals to recruit, retain, and advance diverse technology talent, and operationalize concrete measures to create and sustain an inclusive culture."[88]

Identifying responsibility for holding leaders to achieving time-bound goals is critical. Many experts suggest that when company leadership — especially a CEO or a committee of the board — takes on the responsibility of achieving diversity goals, the company gets better faster.

Not all company diversity policies are created equal. One study found, "Efforts to moderate managerial bias through diversity training and diversity evaluations are least effective at increasing the share of white women, black women, and black men in management. Efforts to attack social isolation through mentoring and networking show modest effects. Efforts to establish responsibility for diversity lead to the broadest increases in managerial diversity."[89]

Attorney Mehri has urged shareholders to press for creation of "Human Capital Committees" on company boards to require management to keep and share robust metrics and "regularly undertake a company-wide review of human capital opportunities and vulnerabilities."[90]

POLICIES AND PRACTICES TO INCREASE RACIAL DIVERSITY: EXAMPLES

+ **Microsoft** announced in 2016 that it will tie executive bonuses to workforce diversity goals[91] , following a 2015 policy change by **Intel**,[92] where executive compensation is tied to achievement of diversity goals and where bonuses are given to employees who refer candidates from underrepresented groups.[93] **IBM** holds monthly diversity councils led by senior leadership and also ties executive compensation to goals set by these councils.[94] At **LinkedIn**, several managers' salaries and bonuses are linked to the achievement of diversity goals, by as much as 20 percent in one instance.[95]

+ In 2016, **Pandora** publicly disclosed its goal to increase the percentage of U.S. employees of color from 35% to 45% by 2020, and to achieve gender, racial and ethnic promotion parity by the same year.[96] Parity will be informed by the surrounding local communities in which Pandora's hubs are located. In 2015, **Pinterest**, after publicly setting diversity goals, boosted hiring rates of underrepresented people of color by 8 percentage points for technical roles and 5 percentage points for non-tech roles.[97]

Linking Compensation and Incentives to Results

Calvert Investments has explained why linking compensation to the achievement of diversity goals is worthwhile: "As compensation is the principal performance incentive at any company, its alignment with diversity objectives conveys the importance of inclusion to high-level managers and helps ensure a focus on advancing diverse employees."[98]

> *"THE COMMITMENT TO WHITE MALE LEADERSHIP DEVELOPMENT MUST FOCUS ON ACCOUNTABILITY FOR IMPROVED BEHAVIOR AND RESULTS."*
>
> — *The Study on White Men Leading Through Diversity & Inclusion*, a report by Greatheart Leader Labs

Linking executive compensation to the achievement of responsible investment goals is not a new type of shareholder engagement. Such companies as Verizon, Kraft and Coca-Cola look at the success of diversity initiatives when determining the wages of top managers.[99] Groups like Ceres have advocated for this practice for years as a method of increasing both financial gains and environmental sustainability in business.[100] According to *Calvert Investments' 2013 A Survey of Corporate Diversity Practices of the S&P 100*, 42 percent of companies in Standard & Poor's 100 Index tied executive compensation to diversity goals.[101] A 2014 report[102] on corporate diversity by U.S. Sen. Robert Menendez found that about half of Fortune 100 companies surveyed (55.4%) tied performance on meeting diversity goals to a portion of executive compensation. Among tech companies, the practice is becoming more common.

Engaging White Executives to Change the System

Without real commitment to change from white executives who currently hold disproportionate power in tech companies, diversity and inclusion efforts can fall short.

Ellen Berry, a sociologist who wrote *The Enigma of Diversity: The Language of Race and the Limits of Racial Justice*, cites a study that concluded corporate diversity trainings "are especially counterproductive, despite being the most popular program in the multibillion-dollar diversity management industry. These trainings do not move white women or most people of color into management, and they actually decrease black women's odds of becoming managers by 7 percent, perhaps because they can breed resentment."[103]

White Men as Full Diversity Partners (WMFDP), a consulting firm that has worked with companies including Lockheed Martin on becoming more diverse and open, points out that decades of diversity work in the corporate sector have disproportionately burdened marginalized groups — women, people of color, LGBTQ communities — in setting and driving diversity-related work.[104]

Another executive development firm, Greatheart Leader Labs, in a 2013 study,[105] suggested that rather than seeking to avoid conflict, companies should assume that conflict is inevitable and often an important step along the way to change. Among other strategies, the report recommends that companies quantify both the financial results (money gained and money saved) of diversity efforts while simultaneously supporting white men as they "define their own self-interest in leading through diversity and inclusion."

Investors have a unique opportunity to push tech companies to change.

Diversity efforts can be most effective when they move beyond *reacting* to the lack of diversity and toward *creating* an alternative multiracial environment that works for all. Crossroads Antiracism Organizing & Training, an organization providing organizing, training and consulting to institutions striving to dismantle racism, developed a Continuum on Becoming an Anti-Racist Multicultural Organization[106] that lays the groundwork for evaluating an institution and moving it from being exclusionary and "monocultural" to becoming an "anti-racist, multicultural" one.

WE ALL HAVE A STAKE

The U.S. tech sector creates products and services that increasingly shape our lives, our economy and our democracy. Yet too many companies in the sector – often bold, innovative and profitable firms – find their systems for recruiting and retaining human capital infected by racial bias. The unfortunate reality is that tech companies provide disproportionate access and opportunity to white men at the exclusion of women and people of color, and to the detriment of society and the economy.

The challenge – for an industry that usually welcomes challenges – is to transform the workplace into one that works for everyone. It can be done.

For those leading the way to improve racial diversity, persistence is a critical part of the strategy. Bringing about systemic change requires re-evaluating and disrupting currently accepted policies, practices and behaviors.

Fortunately, some stakeholders have begun to build frameworks that could shape a more open and responsible future. But there's a lot of work to do.

Open MIC urges you to weigh the data in this report. Listen to the voices. Investors, tech professionals, budding entrepreneurs, consumers — all have a stake in creating a racially diverse tech industry. It's time to break the mold.

A WEALTH OF EXPERTISE

People of color in tech are leading the way by providing a path forward. The organizations listed below are among many groups leveraging the expertise of people of color to shed light on the issue and to make the industry racially diverse. This list is only a sampling, and is not meant to be comprehensive.

+ 20/20 SHIFT exists to help tech and digital media companies diversify their recruitment process, retain minority talent and provide leadership and skills-based training to the industry's next leaders.

+ BLACK FOUNDERS works to increase the number of successful black entrepreneurs in technology.

+ BLENDOOR is a blind recruiting application that hides candidates' name, photo, and dates to mitigate unconscious bias in hiring. Blendoor uses data-driven technology to enable companies to make better hiring decisions based on merit, not molds.

+ CODE2040 creates access, awareness and opportunities for top black and Latino/Latina engineering talent to ensure their leadership in the innovation economy.

+ /DEV/COLOR seeks to create self-sustaining systems that help black software engineers grow their impact.

+ DIGITAL UNDIVIDED trains and supports black women and Latina entrepreneurs. Founder Kathryn Finney is also a partner in the Harriet Fund and co-founder of the HARRIET ANGELS SYNDICATE, both of which focus on startup support for black women and Latina entrepreneurs.

+ GOOD FOR POC is a survey that can be filled out by people of color working at tech companies. It's meant to be a measure of how people of color in the tech industry are treated/feel included at the companies they work for. The goal is to provide an anonymous and safe space for people of color to share their experiences at the companies they work for.

+ LEVEL PLAYING FIELD INSTITUTE (LPFI) is a project of the KAPOR CENTER FOR SOCIAL IMPACT, which aims to make the technology ecosystem and entrepreneurship more diverse and inclusive.

+ PROJECT INCLUDE is an open community working on diversity and inclusion solutions for tech companies. It is led by tech leaders Erica Joy Baker, bethanye McKinney Blount, Tracy Chou, Laura I. Gómez, Y-Vonne Hutchinson, Freada Kapor Klein, Ellen Pao and Susan Wu. The group has developed a list of seven top RECOMMENDATIONS for tech industry leaders seeking real change.

+ SM Diversity: specializes in helping companies attract talent from under-represented gender, race and ethnically diverse communities to drive innovation, teamwork, and bottom-line results.

+ THE TECH CONNECTION is a recruitment platform that supports the professional development of untapped technical talent. It offers individualized career planning and job placement to candidates.

+ THE TECHSTARS FOUNDATION is a networking and grant-making organization for organizations seeking to improve diversity in tech entrepreneurship. The foundation, founded in 2015, awards grants up to $50,000.

+ TECHUP connects diverse tech talent with companies that believe diversity is an advantage, and that inclusive teams are stronger, smarter and better.

END NOTES

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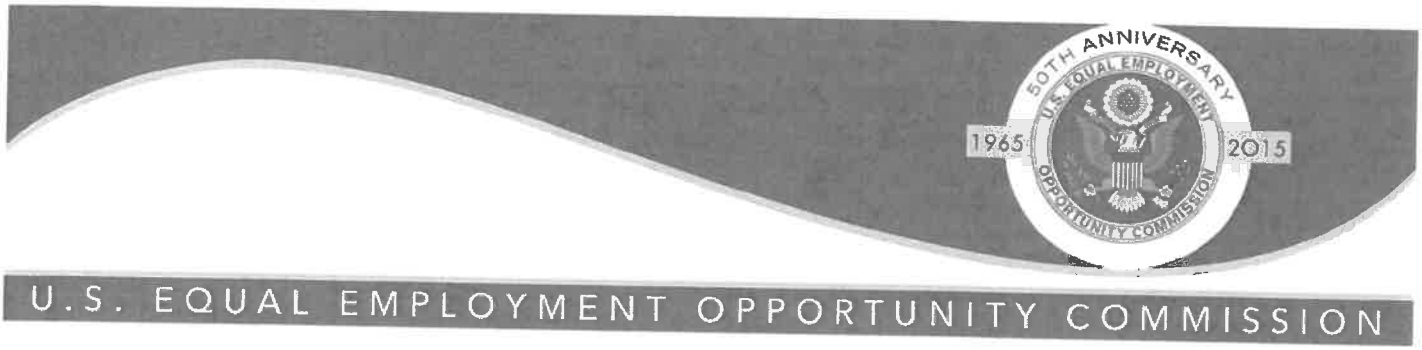

DIVERSITY IN HIGH TECH

U.S. Equal Employment Opportunity Commission
May 2016

DIVERSITY IN HIGH TECH

Executive Summary

The high tech sector has become a major source of economic growth fueling the U.S. economy. As an innovation leader, the high tech sector has impacted how we communicate and access information, distribute products and services, and address critical societal problems. Because this sector is the source of an increasing number of jobs, it is particularly important that the U.S. Equal Employment Opportunity Commission (EEOC) and its stakeholders understand the emerging trends in this industry. Ensuring a sufficient supply of workers with the appropriate skills and credentials and addressing the lack of diversity among high tech workers have become central public policy concerns. This report seeks to shed more light on employment patterns in the high tech industry by providing an overview of literature as a backdrop to understanding high tech employment, and analyzing corresponding summary data from the Employer Information EEO-1 Report (EEO-1)[1] collected in 2014.

Employment in computer science and engineering is growing at twice the rate of the national average.[2] These jobs tend to provide higher pay and better benefits, and they have been more resilient to economic downturns than other private sector industries over the past decade. In addition, jobs in the high tech industry have a strong potential for growth. These jobs are important to companies in all industries that require workers with technology skills. Employment trends in the high tech sector are therefore important to the national economic and employment outlook.

The industries and occupations associated with "high tech" are rapidly evolving. There is *no single high tech industry*—rather, new technology has transformed industries like telecommunications and manufacturing and the functions of numerous occupations. Sections I and II of this report define the high tech industry, or the "high tech sector," as industries that employ a high concentration of employees in science, technology, engineering and mathematics (STEM) occupations and the production of goods and services advancing the use of electronic and computer-based production methods. This sector requires a substantial professional labor force and employs about a quarter of U.S. professionals and about 5-6 percent of the total labor force. Section III of this report examines the top 75 high tech firms in the Silicon Valley area based on a ranking by the *San Jose Mercury News* that looked at revenue, profitability and other criteria to identify leading "Silicon Valley tech firms."

This report aims to add to the public policy discussion by exploring employment trends in the high tech sector in three ways: Section I provides a brief overview of some of the literature

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[1] Beginning in 1966 all employers with 100 or more employees (lower thresholds apply to federal contractors) have been required by law to file the Employer Information Report EEO-1 with the EEOC. In FY 2013 approximately 70,000 employers filed an EEO-1. These forms indicate the composition of an employer's workforces by sex and by race/ethnic category. The EEO-1 form collects data on ten major job categories.

[2] Occupational Employment Projections to 2022, Bureau of Labor Statistics Monthly Labor Review: www.bls.gov/opub/mlr/2013/article/occupational-employment-projections-to-2022.htm .

addressing high tech employment; Section II analyzes EEO-1 data from the high tech sector both nationwide and in the geographic area generally referred to as Silicon Valley; and Section III reviews employment statistics derived from a group of leading Silicon Valley firms. Although growth in the high-tech sector has increasingly occurred in a wide range of geographic areas, this analysis provides a national picture along with a more focused examination on the well-established tech industry in Silicon Valley. The report also identifies geographic areas with high concentrations of high tech jobs that may benefit from future study. Additionally, important areas for further study include employment for older workers and individuals with disabilities.

Section I briefly reviews the literature addressing high tech employment, which has tended to focus on two issues: 1) the supply of labor with appropriate skills and 2) the reasons behind the underrepresentation of women and minority workers in the relevant labor force. One body of literature emphasizes the challenges for the U.S. education system to produce appropriately skilled workers and the factors that influence the prevalence of women and minorities in particular career paths and occupations. Another body of literature focuses on the attrition of women and minorities as students and as employees. This literature cites research and personal experience indicating that bias impedes the full and equal participation of women and minorities in STEM fields.

Section II examines employment trends in the high tech sector through an analysis of the available 2014 EEO-1 data. By using nationwide 2014 EEO-1 data to examine the participation of women and minorities in overall private sector employment compared to that of the high tech sector, we identified several concerning trends:

- Compared to overall private industry, the high tech sector employed a larger share of whites (63.5 percent to 68.5 percent), Asian Americans (5.8 percent to 14 percent) and men (52 percent to 64 percent), and a smaller share of African Americans (14.4 percent to 7.4 percent), Hispanics (13.9 percent to 8 percent), and women (48 percent to 36 percent).

- In the tech sector nationwide, whites are represented at a higher rate in the Executives category (83.3 percent), which typically encompasses the highest level jobs in the organization. This is roughly over 15 percentage points higher than their representation in the Professionals category (68 percent), which includes jobs such as computer programming. However, other groups are represented at significantly lower rates in the Executives category than in the Professionals category; African Americans (2 percent to 5.3 percent), Hispanics (3.1 percent to 5.3 percent), and Asian Americans (10.6 percent to 19.5 percent).

- Of those in the Executives category in high tech, about 80 percent are men and 20 percent are women. Within the overall private sector, 71 percent of Executive positions are men and about 29 percent are women.

Additionally, we examined 2014 EEO-1 data from a geographic area associated with Silicon Valley. This includes the San Francisco-Oakland-Fremont core-based statistical area (CBSA) and Santa Clara County. The labor force in these areas has notably different demographics from that of the U.S. as a whole. By using EEO-1 data specific to the Silicon Valley area, we can see how its tech workforce differs demographically from the tech workforce nationwide.

Finally, Section III, as the third avenue to examine the nature of employment in high tech industries, uses 2014 EEO-1 data to examine the labor force participation rate at select leading "Silicon Valley tech firms," identified by a San Jose Mercury News analysis. Below are some observations:

- Among Executives, 57 percent of employees were white, 36 percent were Asian American, 1.6 percent were Hispanic and less than 1 percent were African American.

- These firms had a notable contrast in the demographics of professional as compared to management jobs (executives and managers combined). Asian Americans make up 50 percent of professional jobs among these firms while comprising 36 percent of management positions. This is roughly a negative gap of 14 percentage points. White employees make up 41 percent of professional jobs and 57 percent of management jobs. This is roughly a positive difference of about 16 percentage points.

- In Silicon Valley, employment of women and men in non-technology firms is at about parity with 49 percent women and 51 percent men. This compares to the 30 percent participation rate for women at 75 select leading Silicon Valley tech firms.

- When the Executives and Managers job categories are combined, African American workers are less than 1 percent of this group at these select leading Silicon Valley firms, and Hispanic workers are 1.6 percent.

DIVERSITY IN HIGH TECH

This report examines demographic diversity in the "high tech" sector. This is a timely and relevant topic for the Commission due to the growth of this sector, the quality of the jobs it provides, and the influence that this work has on other industries and on society in general.

This report is divided into three major sections. The first section provides a brief, introductory literature review to introduce the relevant issues and provide a backdrop for the data points that follow. The second section examines employment trends in the high tech sector using 2014 EEO-1 data[3] by comparing tech and overall private industry nationwide and within the Silicon Valley geographic area. The final section uses 2014 EEO-1 data to focus on the leading "Silicon Valley tech firms" as recently identified by a popular news source local to the area.

I. LITERATURE REVIEW

HIGH TECH: EVOLUTION OF THE INDUSTRY

Development of a high tech workforce has long been a source of concern; it is a major growth sector that requires workers with specific skills often perceived to be in relatively short supply among U.S. workers. The available work in this industry is considered to be highly sought after, as the jobs tend to pay well and offer attractive benefits. At the same time, lack of diversity in employment has led to under-utilization of available talent and under-recruitment of potentially valuable employees. When examining the pipeline for high tech jobs, a mixed story develops. The literature indicates some increase in employment of women and non-white workers in these occupations, accompanied by a steady exodus of these same workers, particularly women, from tech jobs.

The industries and occupations associated with "high tech" are rapidly evolving. There is no single high tech industry; rather, new technology has transformed industries like telecommunications and manufacturing and the functions of numerous occupations, from clerical work to scientific research. Occupations unknown a decade earlier have become common (Baldwin and Gellatly, 1998; DeSilver, 2014). Classification schemes that rely on a single-measure of technological expertise, as many do, may incorrectly rank industries and/or classify sectors.

Companies utilizing advanced technological processes, requiring a labor force with cutting-edge technical competencies to develop innovative products, are found in many industries, not only high tech. Industries perceived as low-tech are not devoid of high tech firms, nor are high tech industries comprised exclusively of high tech firms. Consequently, broad generalizations at the industry-level are imprecise. On average, industries that may be classified as low-tech by some indices contain half as many high tech firms as can be found in high tech industries.

[3] EEO-1 reports filed by employers with more than 100 employees provide data based on race, color, sex and national origin, but do not report data on age or disability. We are aware that both groups are underrepresented in the tech workforce, suggesting the need for research to understand the causes and potential solutions.

Consequently, it should not be claimed that high-knowledge, high tech firms are confined exclusively to these more visible high tech industries (Baldwin and Gellatly (1998). Research on this project revealed that "typical," well-known high tech companies were in such industries as auto manufacturing (NAICS 3361), retail stores (NAICS 4539), information services (NAICS 5191), consumer goods rental (NAICS 5322) and office administrative services (NAICS 5611).

Baldwin and Gellatly (1998) classify high tech firms as those producing innovative technology; they introduce new products and processes; they place great emphasis on technology; they appreciate the importance of a skilled workforce, and they train their workers.[4] This competency-based approach represented a considerable advance over previous efforts: it formally recognized the multidimensional nature of technological expertise.

DeSilver (2014) notes that based on data collected from November 2009 to May 2012, about 3.9 million workers — roughly 3 percent of the nation's payroll workforce (Occupational Employment Statistics, Bureau of Labor Statistics (BLS)) — work in what we might think of as "core" tech occupations — not people who simply use computing technology in their jobs, but whose jobs involve making that technology work for the rest of us. Occupations involving the installation and repair of telecommunications lines and equipment, as well as computer repairers were excluded.

Figure 1 shows just how different the structure of the technology industry was in 2012 compared to 15 years earlier.

[4] This classification is now dated as tech companies want educational institutions to bear the training cost, including software-specific training. See "The Hiring Dilemma for High Tech Firms: Make vs. Buy" " Knowledge @ Wharton

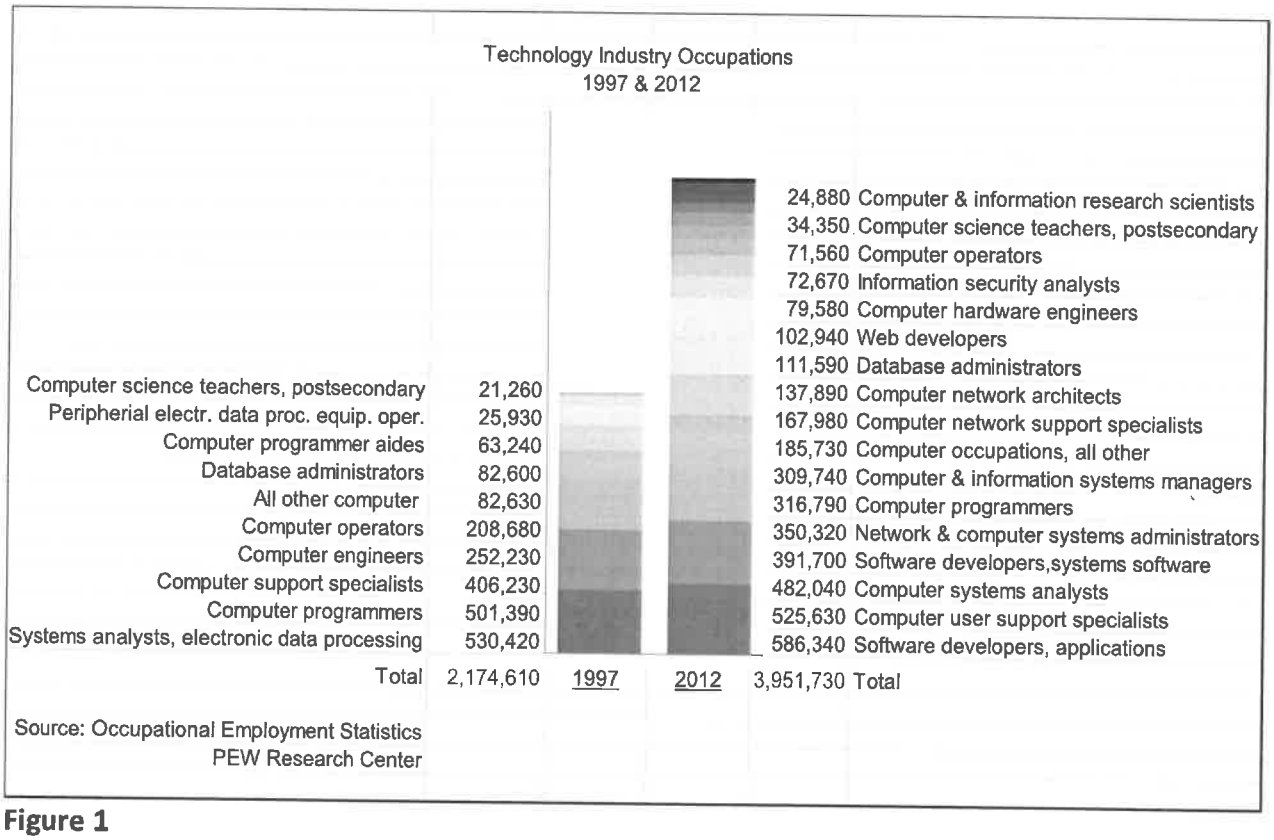


Figure 1

Some 2012 occupations, such as web developers and information security analysts, simply did not exist in 1997, while others have dramatically grown (programmers and software developers, computer and network support specialists) or shrunk (computer operators). Computers have become ubiquitous in the workplace; their use is no longer confined to a specialist. Use of computers is a general skill expected of most office, technical, and professional employees.

HIGH TECH GEOGRAPHY: DISPERSING

The location of high tech industries has also changed substantially. From its early establishment in large compounds in suburban office parks of Silicon Valley, CA and Route 128 in Boston, the industries dispersed to urban areas across the US and around the world (Florida, 2012). High tech companies, like their products, have become an integral part of the production of goods and services. They have moved from a niche economic product dependent on highly specialized expertise to become a major source of economic vitality.

The remarkable growth and dispersion of high tech products and companies has been accompanied by anxiety over the ability of the US educational system to supply an adequate workforce to support its rapid expansion and development of new products. Appendix Table I-A shows employment growth in selected science, technology, engineering and mathematics (STEM) occupations. It has been noted that there are almost twice as many job postings in STEM fields as there are qualified applicants to fill them. Further, when ranked against other developed countries in the area of problem solving with technology the U.S. came in absolute

last. Groups such as the STEM Education Coalition urge that additional resources be allocated to the computer sciences, and higher educational standards for math and science education starting in elementary school to prepare the future workforce. Modern manufacturing requires a computer literate worker capable of dealing with highly specialized machines and tools that require advanced skills (STEM Education Coalition).

However, other sources note that stereotyping and bias, often implicit and unconscious, has led to underutilization of the available workforce. The result is an overwhelming dominance of white men and scant participation of African Americans and other racial minorities, Hispanics, and women in STEM and high tech related occupations. *The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology*, published data in 2008 showing that while the female talent pipeline in SET[5] was surprisingly robust, women were dropping out of the field large numbers. Other accounts emphasize the importance of stereotypes and implicit bias in limiting the perceived labor pool (see discussion below).

Moughari et al., 2012 noted that men comprise at least 70 percent of graduates in engineering, mathematics, and computer science, while women dominate in the lower paying fields. Others point out that in this is not uniformly the case in all science and math occupations and that, while underrepresented among those educated for the industry, women and minorities are *more* underrepresented among those actually employed in the industry. It has been shown, for example, that men are twice as likely as women to be hired for a job in mathematics when the only difference between candidates is gender (Ernesto Reubena et al. 2014).

LABOR DIVERSITY: SUPPLY vs. DEMAND

Attributing lack of employment diversity in high tech industries to lack of applicant diversity and self-selection of minorities and women away from STEM fields focuses on only part of the industries' hiring and retention situation. While there is some truth to the "pipeline" theory and anxiety over the ability of the US educational system to provide a sufficiently large, well trained, and diverse labor pool, there are additional factors at play. For example, about nine percent of graduates from the nation's top computer science programs are from under-represented minority groups. However, only five percent of the large tech firm employees are from one of these groups.[6] This presents the unlikely scenarios that either major employers in the field are unable to attract four out of nine under-represented minority graduates from top schools or almost half of the minority graduates of top schools do not qualify for the positions for which they were educated.

Citing The Urban Institute[7], "labor market indicators do not demonstrate a supply shortage. The United States' education system produces a supply of qualified [science and engineering]

[5] Science, Engineering, and Technology (SET).

[6] according to Education Department data analyzed by Maya A. Beasley, associate professor of sociology at the University of Connecticut, quoted in Gonzalez and Kuenzi, 2012.

[7] Lowell, B. Lindsay, and Hal Salzman. The Urban Institute. Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand. The Urban Institute, 2007.

graduates in much greater numbers than the jobs available." Estimates indicate that close to 50 percent of STEM graduates in the U.S. are not hired in STEM-related fields (Lindsay & Salzman, 2007).

Sources are largely consistent that the number of people receiving undergraduate degrees in science and engineering has increased markedly over the past decade. According to the U.S. Census Bureau, the percentage of U.S. college graduates with bachelor's degrees in science and engineering (S&E) was 36.4 percent in 2009 (approximately 20 million people). National Science Foundation[8] estimates are similar: the percentage of bachelor's degrees in S&E fields has been approximately 30 to 35 percent of all bachelor's degrees for the past four decades. However, because the U.S. college-age population grew during these years, the total number of science and engineering (S&E) bachelor's degrees awarded annually more than doubled between 1966 and 2008 (from 184,313 to 494,627).

Women account for relatively small percentages of degree recipients in certain STEM fields: only 18.5 percent of bachelor's degrees in engineering went to women in 2008. (Williams, 2015) Women accounted for 77.1 percent of the psychology degrees and 58.3 percent of the biological and agricultural sciences degrees in 2008 (Data from the National Science Foundation, National Center for Science and Engineering Statistics[9]).

Gonzalez and Kuenzi, 2012 make the following observations:

Graduate enrollments in science and engineering grew 35 percent over the last decade. Notably, science and engineering enrollments grew more for racial and ethnic groups generally under-represented in science and engineering.

- Hispanic/Latino enrollment increased by 65 percent
- American Indian/Alaska Native enrollment increased by 55 percent
- African American enrollment increased by 50 percent

Since 1966, the percentage of doctorates in S&E fields has ranged between approximately 56 percent and 67 percent of all graduate degrees (where a field of study has been reported). The total number of doctoral degrees in S&E fields has nearly tripled, growing from 11,570 in 1966 to 32,827 in 2008 (Peck, 2015). Graduate enrollments show similar upward trends.

The AFL-CIO reported that, based on Bureau of Labor Statistics data, the median weekly earnings for women (2012) were 11 to 25 percent lower than they were for men in every STEM occupation for which there is available data. But this may be less of a difference than in other

[8] National Science Foundation, cited in Gonzalez and Kuenzi 2012

[9] Bachelor's, master's, and doctor's degrees conferred by postsecondary institutions, by field of study: Selected years, 1970-71-2011-12. Available at: http://nces.ed.gov/programs/digest/2013menu_tables.asp

professional fields, as in 2013, on average, men employed in professional and related occupations earned 27 percent more than women.[10]

Additionally, black professionals represented 9.3 percent of the professional workforce and Hispanic professionals 8.2 percent.

- In computer and mathematical occupations, 8.3 percent of workers were black or African American, 6.3 were Hispanic or Latino.
- In the life, physical, and social sciences, black professionals were under-represented, making up 5.6 percent of the workforce, and in architecture and engineering occupations, Black professionals were just 5.5 percent of the workforce in 2013.
- Workers of Hispanic origin comprised 7.5 percent of the architecture and engineering field and 7.9 percent of life, physical, and social scientists.[11]

Based on data from the American Community Survey, there is a racial and ethnic pay gap as well: Asian Americans reported the highest average earnings in STEM occupations, while non-Hispanic whites also had above average earnings; black and Hispanic professionals earned below average wages in 2012.[12]

EXITING TECH & RELATED FIELDS

Over time, over half of highly qualified women working in science, engineering and technology companies quit their jobs (Hewlett et al., 2008). In 2013, just 26 percent of computing jobs in the U.S. were held by women, down from 35 percent in 1990, according to a study by the American Association of University Women. Although 80 percent of U.S. women working in STEM fields say they love their work, 32 percent also say they feel stalled and are likely to quit within a year. Research by The Center for Work-Life Policy shows that 41 percent of qualified scientists, engineers and technologists are women at the lower rungs of corporate ladders but more than half quit their jobs.

This loss appears attributable to the following: 1) inhospitable work cultures; 2) isolation; 3) conflict between women's preferred work rhythms and the "firefighting" work style generally rewarded; 4) long hours and travel schedules conflict with women's heavy household management workload; and 5) women's lack of advancement in the professions and corporate ladders. If corporate initiatives to stem the brain drain reduced attrition by just 25 percent, there would be 220,000 additional highly qualified female STEM workers (Hewlett et al., 2008).

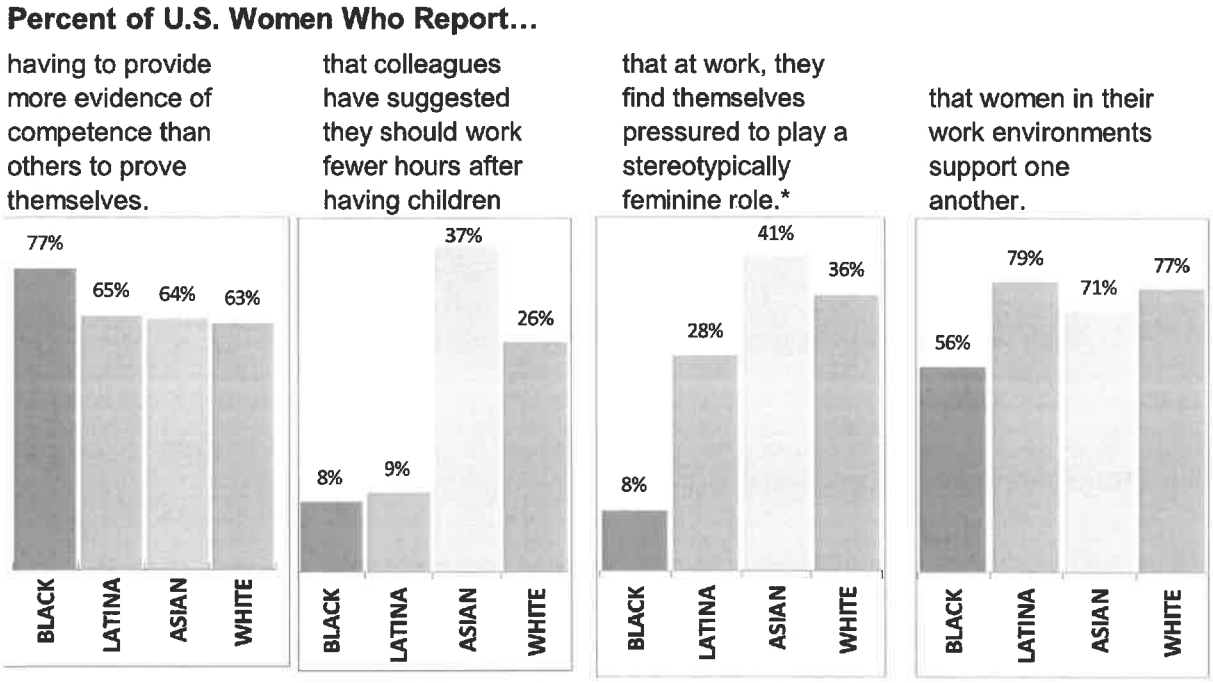
Williams (2015) posits that it is bias that pushes women out of STEM jobs, rather than pipeline issues or personal choice accounting for their absence. Based on a survey and in-depth

[10] U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Household Data Annual Average 2012, Table 39. (Cited in AFL-CIO, 2014)
[11] U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Household Data Annual Average 2013, Table 11. (Cited in AFL-CIO, 2014)
[12] U.S. Census Bureau, DataFerrett, American Community Survey, Public Use Microdata, 2012. (Cited in AFL-CIO, 2014)

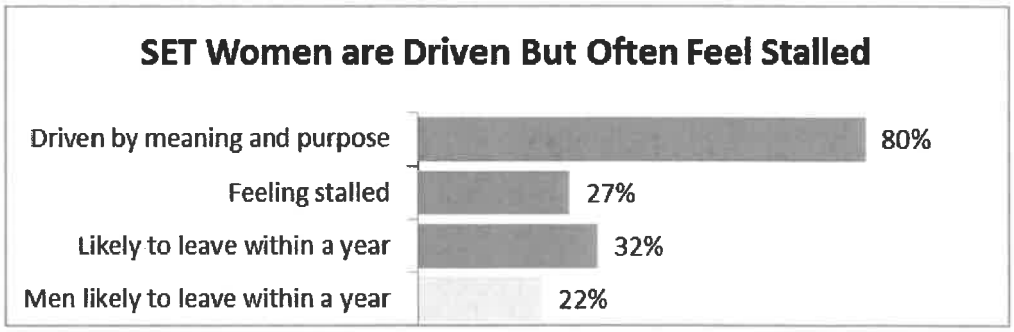
interviews of female scientists[13] (557 survey participants and 60 interviewees), Williams makes the following observations:

- Two-thirds of women report having to prove themselves over and over; their success discounted and their expertise questioned.
    - Three-fourths of Black women reported this phenomenon.
- Thirty-four percent reported pressure to play a traditionally feminine role, including 41 percent of Asian women.
    - Fifty-three percent reported backlash from speaking their minds directly or being outspoken or decisive.
    - Women, particularly Black and Latina women, are seen as angry when they fail to conform to female stereotypes
- Almost two thirds of women with children say their commitment and competence were questioned and opportunities decreased after having children.
- Three fourths of women surveyed said that women in their workplace supported each other; one fifth said they felt as if they were competing with women colleagues for "the woman spot."
- Bias functions differently depending on race and ethnicity. Isolation is a problem: 42 percent of Black women, 38 percent of Latinas, 37 percent of Asian women and 32 percent of white women agreed that socializing with colleagues negatively affect perceptions of their competence.

[13] Women in science, technology, engineering, or math.

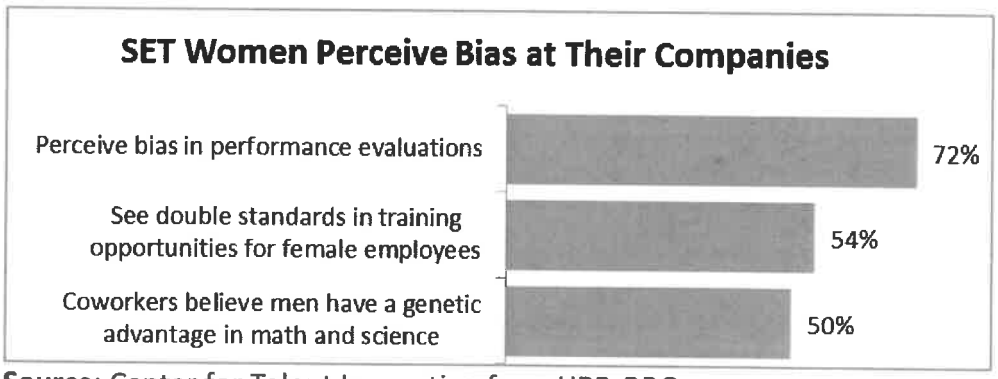


Source: Joan C Williams, Katherine W. Phillips, and Erika V. Hall from HBR.ORG
Figure 2



Source: Center for Talent Innovation from HBR.ORG
Figure 3[14]

[14] SET Science, Engineering, and Technology



Source: Center for Talent Innovation from HBR.ORG
Figure 4

EXIT FROM THE EDUCATIONAL PIPELINE

The impact of the "exits" discussed above is perhaps most problematic in the educational pipeline. Women are no longer a minority within higher education—in fact, women's enrollment in graduate education in the United States has been greater than men's for the past three decades. As of 2012, there were 13 women enrolled for every 10 men. However, a greater number of male students seem to graduate with science degrees, as compared to their female classmates. In the physical sciences for example, seven B.S. degrees are granted to women for every 10 granted to men; three M.S. degrees are granted to women for every five granted to men; one Ph.D. degree granted to a woman for every two granted to men (Jahren, 2016).

Women who leave science report both isolation and intimidation as barriers to their success. While 23 percent of freshmen reported not having experienced these barriers, only three percent of seniors did, suggesting that this reaction to women in science education is a lesson learned by female students over time (Jahren, 2016). In a survey of 191 female fellowship recipients, 12 percent indicated that they had been sexually harassed as a student or early professional (Jahren, 2016).

SUMMARY AND CONCLUSION

Despite rapid transformation in the field, the overwhelming dominance of white men in the industries and occupations associated with technology has remained. This tendency includes occupations requiring less education than a four-year bachelor's degree (*Fortune*, 2014).

Discussion of the lack of gender, racial and ethnic diversity in the high tech industries generally divides into two themes: the "pipeline" problem—STEM occupations attracting white men—and the inhospitable culture in relevant industries and occupations forcing women and minorities to tolerate the environment or leave the field.

The literature summarized below represents both themes. The "pipeline problem" is represented by Moughari et al. (2012) and Gonzalez and Kuenzi (2012). The second theme is documented through numerous published analyses, mostly addressing the challenges faced by women (D'Anastasio, 2015; Hewlett et al., 2014; Peck, 2015; Reubena et al., 2014; Lien, 2015; Hewlett et al., 2008). Evidence of dissatisfaction among minority groups is more likely to be found in the comments sections following "pipeline" articles. Attrition of women mid-career is described as a substantial contributor to the paucity of women in STEM professions and high tech industries (Jahren, 2016).

The reluctance of high tech companies to train new employees could be contributing to the lack of diversity. Williams (2015) provides a technological argument for this trend. The Harvard Business Review (2015) addresses the issue of "guest workers" on H-1B visas; immigration and jobs in high tech (*Knowledge* 2005). A high tech recruiter points to the mystique of elite colleges and advocates job candidate anonymity to increase diversity in hiring (*The Economist*, 2013). There are notable alternative efforts to spread high tech skills and introduce women and minorities to the joys of technology based work. A few of the many available examples are Black Girls Code, Hack the Hood, Lesbians Who Tech, Code 2040, #YesWeCode, and the Center for Talent Innovation.

The fast-changing nature of the high tech industry may contribute to the exit of new employees such as women and non-whites. A study by the Wharton School reports research findings and recommendations. They note that Human Resources strategy complements technology strategy; in a fast-paced industry, product life cycles are growing shorter. Firms are facing more opportunities for change, requiring more adjustments to the workforce. When skills need to be adjusted, firms may find that it pays to buy the skills instead of developing them.

The opposite is true for slower moving industries operating in marketplaces with less change — these findings could be significant for human resource management strategies. As the pace of technological change has quickened, and as global competition has shortened product life cycles, firms have had to rethink their technology investment strategies and their human resource management practices in order to remain competitive.

See the Annotated Bibliography for supplemental tables and graphs.

II. EXAMINATION OF NATIONWIDE AND SILICON VALLEY EEO-1 DATA

EMPLOYMENT DIVERSITY IN THE HIGH TECH SECTOR

Explanation of Data

This section focuses on sex, race, and ethnicity diversity in the U.S. high tech sector. The definition of "high tech sector" that we use is the group of industries, based on the four-digit code of North American Industry Classification System (NAICS), listed in Table 1. An industry is considered high tech if "technology-oriented workers" within an industry, as identified by occupations of the staff, account for at least 25 percent of the total jobs within the listed industries.

TABLE 1: INDUSTRIES USED TO DEFINE HIGH TECH

4-Digit Code	INDUSTRY LABEL
3254	Pharmaceutical and Medicine Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
3341	Computer and Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
3345	Navigational, Measuring, Electrometrical, and Control Instruments Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
3364	Aerospace Product and Parts Manufacturing
3391	Medical Equipment and Supplies Manufacturing
5112	Software Publishers
5179	Other Telecommunications
5191	Other Information Services
5413	Architectural, Engineering, and Related Services
5415	Computer Systems Design and Related Services
5417	Scientific Research and Development Services
5419	Other Professional, Scientific, and Technical Services

The data utilized for this section comes from the 2014 EEO-1 reports from US private sector employers.[15] The EEO-1 form collects data on ten major job categories.[16]

Because more than half of the high tech employment was made up of Professionals (44 percent) and Technicians (10.7 percent, see Figure 7), these job groups received separate analysis, along with the management job groups (Executives, Senior Level Officials & Managers, and First/Mid-Level Officials and Managers).

In our discussion below, we will use national high tech sector figures as well as figures from two geographic areas that we believe encompass the heart of what is known as Silicon Valley: San Francisco-Oakland-Fremont[17], in California (CA) and Santa Clara County, CA. Other high tech corridors in the U.S. were also identified for potential future research in Appendix Table I.

Summary of Findings Compared with all industries reported in the 2014 EEO-1 private sector survey, overall participation rates of whites, Asian Americans, and males in U.S high tech industries were disproportionally higher, especially in the Silicon Valley geographic area.
African Americans and Hispanics were under-represented nationwide in the high tech sector when compared with the overall private industries, (see Figure 5); African Americans and Hispanics were especially under-represented in the high tech sector in the Silicon Valley geographic area.

Whites and men dominated high tech leadership positions as Executive/Senior Level Officials and Managers (Executives) and First/Mid-Level Officials and Managers (Managers) nationwide, and dominated even more strongly in the Silicon Valley geographic area.

Women lagged behind men in leadership positions and in technology jobs, as Technicians and Professionals, in the high tech sector. These gender differences were particularly pronounced in high tech sector of Santa Clara County.

African Americans and Hispanics were disproportionately fewer in leadership positions and in technology jobs in the high tech sector nationwide. These groups had negligible employment representation in high tech industries in the San Francisco Bay Area.

Asian Americans were represented in management and executive positions at a markedly lower rate than their representation in Professional occupations in the high tech industry both nationally and in Silicon Valley.

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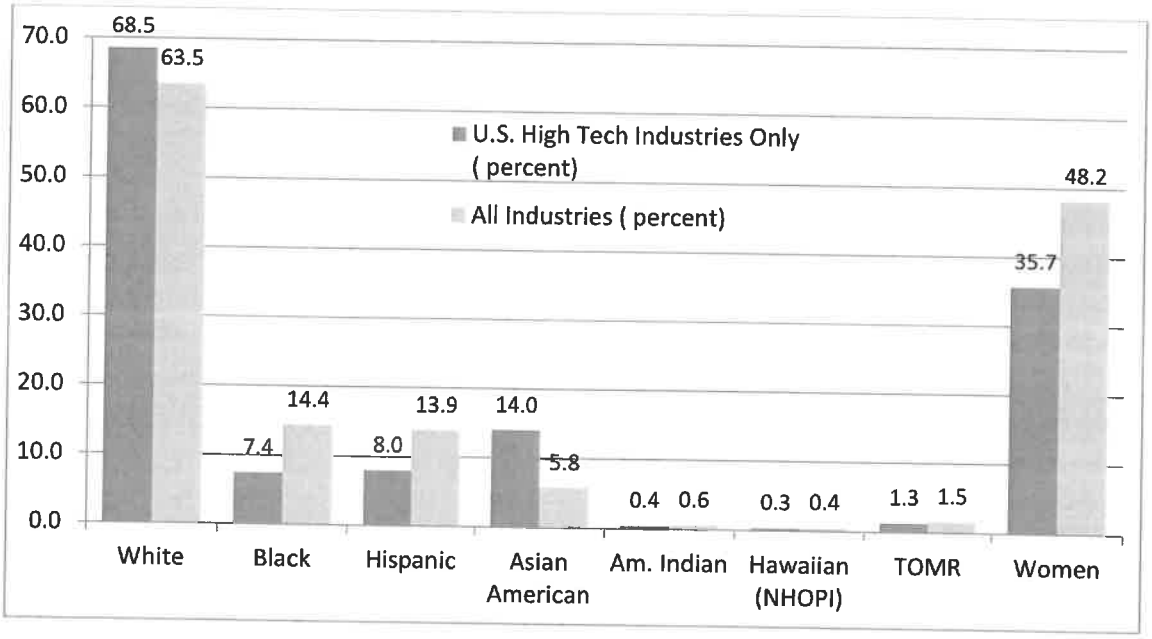
[15] Beginning in 1966 all employers with 100 or more employees (lower thresholds apply to federal contractors) have been required by law to file the Employer Information Report EEO-1 with the EEOC. In FY 2014 approximately 70,000 employers filed an EEO-1. These forms indicate the composition of an employer's workforces by sex and by race/ethnic category. More information about the EEO-1 survey and the associated reports can be found at www.eeoc.gov. Employment totals and subgroup aggregates were generated from four types of reports: single establishment report (Type 1 Report), headquarters report (Type 3 Report), multiple establishment report with at least 50 workers (Type 4 report), and multiple establishment report with fewer than 50 workers (Type 8 Report). This inclusion criterion is different from our typical EEO-1 aggregates which we release annually to the public on our website.

[16] 1) Executives, Senior Level Officials and Managers; 2) First/Mid-Level Officials and Managers; 3) Professionals; 4) Technicians; 5) Sales Workers; 6) Administrative Support Workers; 7) Craft Workers; 8) Operatives; 9) Laborers and Helpers; and 10) Service Workers. For examples of job titles and descriptions see https://www.eeoc.gov/employers/eeo1survey/jobclassguide.cfm

[17] This is a core-based statistical area, which is defined by Office of Management and Budget as an area that consists of one or more counties anchored by a large urban center, including at least 10,000 people. Adjacent counties are included if they are socioeconomically tied to the urban center.

INDUSTRY PARTICIPATION BY GENDER SEX AND RACE GROUPS
HIGH TECH VS. ALL PRIVATE INDUSTRIES



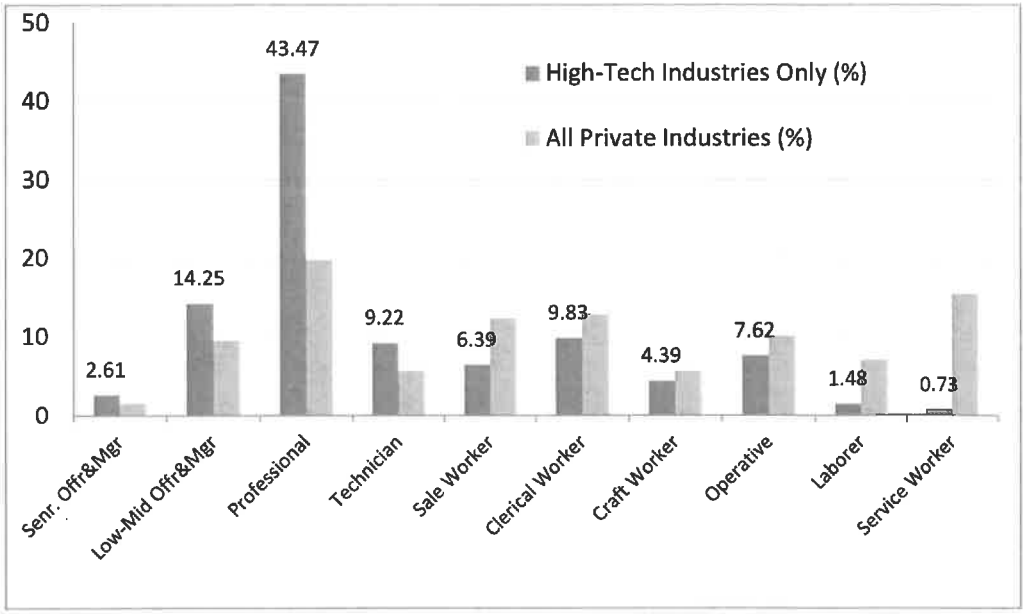
	High Tech Industries Only (percent)	All Private Industries (percent)
WHITE	68.53	63.47
BLACK	7.4	14.38
HISPANIC	7.97	13.86
ASIAN AMERICAN	14.04	5.77
AM. INDIAN	0.42	0.56
HAWAIIAN (NHOPI)	0.34	0.43
TWO OR MORE RACES	1.3	1.53
WOMEN	35.68	48.16
TOTAL EMPLOYMENT (N)	**5,341,599**	**57,399,178**

Figure 5
Source: Equal Employment Opportunity Commission, Employer Information Numbers may not add up to totals due to rounding.

As shown in Figure 5, compared to all industries in the U.S. private sector, high tech had a relatively larger share of whites (68.5 percent vs. 63.5 percent), and a larger share of Asian Americans (14 vs. 5.8 percent). Other groups were less represented by a significant margin in the tech sector compared to all private industry, including African Americans (7.4 vs. 14.3

percent) and Hispanics (8 vs. 13.9 percent). There was a 12-percentage-point difference between female participation in high tech versus all private industries (35.7 vs. 48.2 percent).

OCCUPATIONAL DISTRIBUTION
HIGH TECH VS. ALL PRIVATE INDUSTRIES



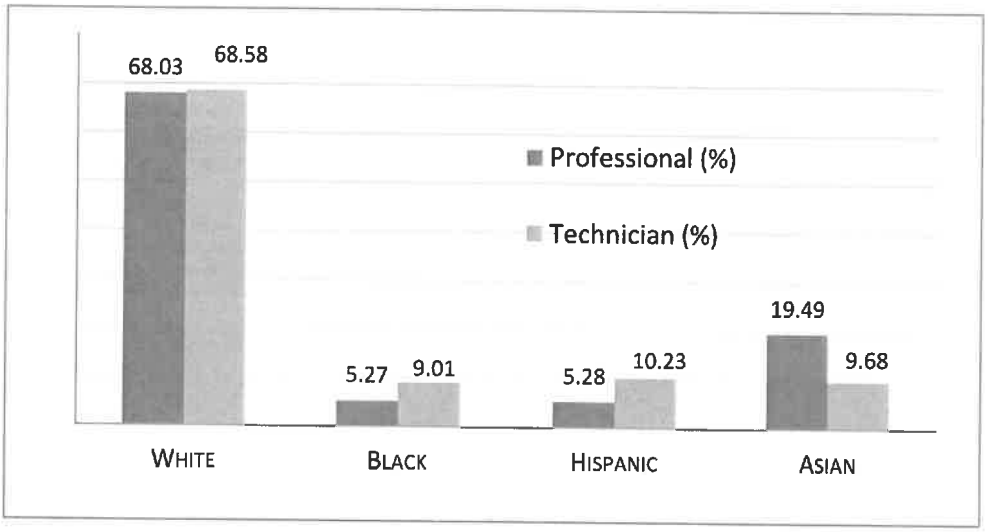
	High Tech Industries Only (percent)	All Private Industries (percent)
Executives, Senior Officials and Managers	2.61	1.58
First/Mid Officials and Managers	14.25	9.51
Professionals	43.47	19.76
Technicians	9.22	5.66
Sale Workers	6.39	12.32
Clerical Workers	9.83	12.84
Craft Workers	4.39	5.61
Operatives	7.62	10.09
Laborers	1.48	7.07
Service Workers	0.73	15.5
Total Employment (percent)	**100.00**	**100.00**

Figure 6
Source: Equal Employment Opportunity Commission, Employer Information Reports Numbers may not add up to totals due to rounding.

Figure 6 shows that two occupational categories—Professionals and Technicians—are represented at higher rates in the tech sector than in other industries. Together they accounted

for approximately 54 percent of the total high tech employment, compared to the 25.4 percent of all industries combined nationally, meriting further examination. Technology workers in high tech industries, defined in this analysis as Professionals and Technicians, include significant numbers of engineers, software developers and programmers, life scientists and mathematicians.

PROFESSIONALS AND TECHNICIANS IN HIGH TECH BY RACE AND ETHNICITY



	EEO-1 Professionals (percent)	EEO-1 Technicians (percent)
White	68.03	68.58
Black	5.27	9.01
Hispanic	5.28	10.23
Asian American	19.49	9.68
Total Employment (N)	**2,321,969**	**452,359**

Figure 7

Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

Figure 7 examines employment figures in the Professional and the Technical occupational categories in the high tech sector. Examples of Professional occupations in this sector include computer programmers, software developers, web developers, and database administrators. Examples of technical occupations in this sector include electrical and electronics engineering

technicians, electro-mechanical technicians, and medical records and health information technicians.

Whites made up the largest share of Professionals (68.03 percent) with Asian Americans holding the second largest share at 19.5 percent. As a contrast, African Americans made up 5.27 percent and Hispanics 5.28 percent. Whites held a dominant share of the Technicians job group as well (68.6 percent). African Americans, Hispanics, and Asian Americans each represented approximately 9-10 percent of Technicians.

TABLE 2: LEADERSHIP POSITIONS BY RACE AND ETHNICITY IN HIGH TECH

	Executives (percent)	Managers (percent)
White	83.31	76.53
Black	1.92	4.12
Hispanic	3.11	4.91
Asian American	10.5	12.98
Totals (N)	**139,575**	**761,380**

Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

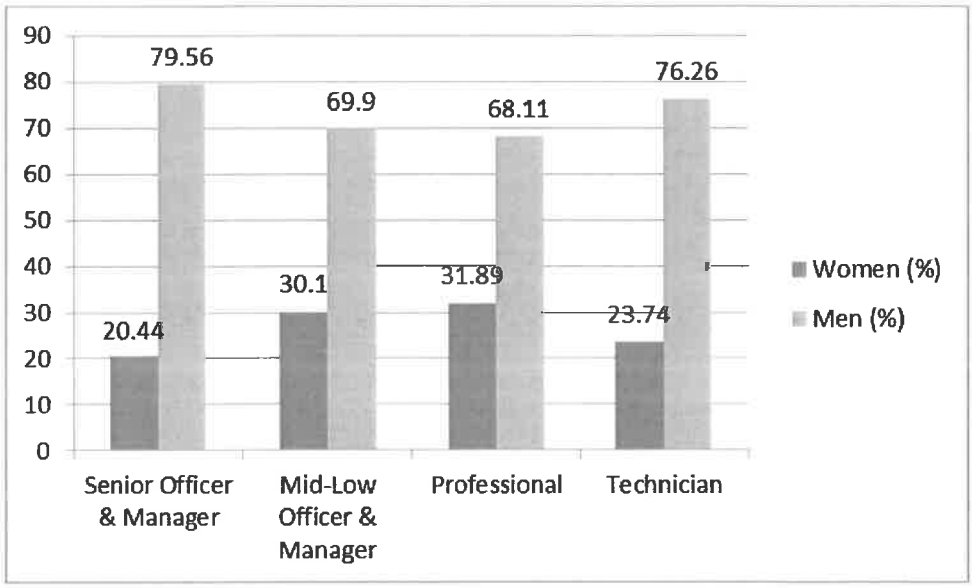
Table 2 shows that of leadership positions in high tech, over four-in-five, or 83.3 percent, of Executives were white compared to 10.5 percent for Asian Americans, 1.9 percent for African Americans and 3.1 percent for Hispanics. Executives in the high tech sector would likely include the chief executive officer, and the chief technology officer, as well as Executives found in other industries such as the chief human capital officer. Managers in the high tech industry would include occupations like computer and information systems managers. Note that Asian Americans make up around 19.5 percent of Professionals in the high tech industry but only 10.5 percent of its Executives, in this analysis of the data.

TABLE 3: SELECT JOB CATEGORIES BY RACE AND ETHNICITY IN HIGH TECH v. ALL PRIVATE INDUSTRY					
High Tech	WHITE	BLACK	HISPANIC	ASIAN AMERICAN	Total Employment (N)
Executives, Senior Officials and Managers	83.31%	1.92%	3.11%	10.55%	139,575
First/Mid Officials & Managers	76.53%	4.12%	4.91%	12.98%	761,380
Professionals	68.03%	5.27%	5.28%	19.49%	2,321,969
Technicians	68.58%	9.01%	10.23%	9.68%	452,359
All Private Industry	WHITE	BLACK	HISPANIC	ASIAN AMERICAN	Total Employment (N)
Executives, Senior Officials & Managers	86.97%	3.13%	3.87%	4.88%	833,367
First/Mid Officials & Managers	77.53%	7.12%	7.43%	6.31%	4,766,041
Professionals	72.89%	7.64%	5.79%	11.74%	10,534,689
Technicians	67.17%	13.79%	10.09%	6.56%	2,870,353

Table 3 examines select occupational categories by race and ethnicity in high tech and overall private industry. If we assume there is a path of advancement from the ranks of Professional into the Executives, Senior Officials and Managers category, we would expect that racial groups would be similar between the two job categories.[18] However, whites are represented at a larger rate in the Executives, Senior Officials and Managers category. African Americans and Asian Americans are represented at about half the rate within Executives, Senior Officials and Managers than in the Professionals job category. Hispanics are also less represented in Executives, Senior Officials and Managers than in Professionals.

[18] Another possibility is that CEOs and other top Executives may be more likely to be business management professionals and have a business management background as opposed to a tech or STEM background.

WOMEN IN LEADERSHIP POSITIONS AND TECHNOLOGY JOBS IN U.S. HIGH TECH INDUSTRIES



	Women (percent)	Men (percent)
Executives, Senior Officials & Managers	20.44	79.56
First/Mid Officials & Managers	30.10	69.90
Professionals	31.89	68.11
Technicians	23.74	76.26
Total Employment	**1,846,801**	**3,494,798**

Figure 8

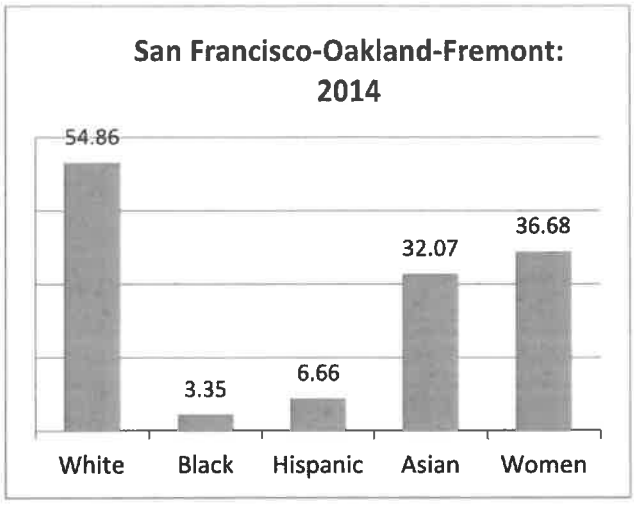
Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

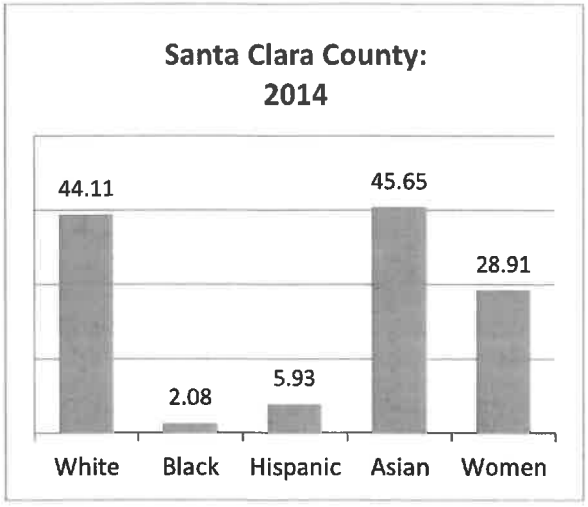
Figure 8 shows female employment in leadership positions in high tech industries. For every one female Executive, Senior Official and Manager there were four males in the same ranking position (79.6 percent vs. 20.4 percent). Female high tech workers, in contrast to their male counterparts, were also significantly outnumbered in technology jobs as Professionals (31.9 percent vs. 68.1 percent) and Technicians (23.7 percent vs. 76.3 percent).

TABLE 4: SELECT JOB CATEGORIES BY SEX IN HIGH TECH v. ALL PRIVATE INDUSTRY				
	High Tech		All Private Industry	
	Women (percent)	Men (percent)	Women (percent)	Men (percent)
Executives, Senior Officials and Managers	20.44	79.56	28.81	71.19
First/Mid Officials & Managers	30.1	69.9	38.96	61.04
Professionals	31.89	68.11	53.42	46.58
Technicians	23.74	76.26	50.12	49.88
Total Employment	1,846,801	3,494,798	24,422,889	26,728,926

Table 4 presents select occupational categories by sex comparing the high tech sector with overall private industry. As you can see above, women comprise a smaller percentage (20 percent) of Executives, Senior Officials and Managers in the high tech industry than they do in the overall workforce (29 percent). Moreover, women are represented at lower rates in all high tech job categories as compared to overall private industry. The differences in the Professional (roughly a 21 percentage point difference) and Technician categories (roughly a 26 percentage point difference) are particularly striking.

HIGH TECH PARTICIPATION OF WOMEN AND MINORITIES IN SAN FRANCISCO BAY AREA: 2014





	San Francisco-Oakland-Fremont	Santa Clara County
White	54.86	44.11
Black	3.35	2.08
Hispanic	6.66	5.93
Asian American	32.07	45.65
Am. Indian	0.28	0.22
Hawaiian (NHOPI)	0.71	0.5
TOMR	2.07	1.5
Women	36.68	28.91
Total Employment	**198,275**	**257,342**

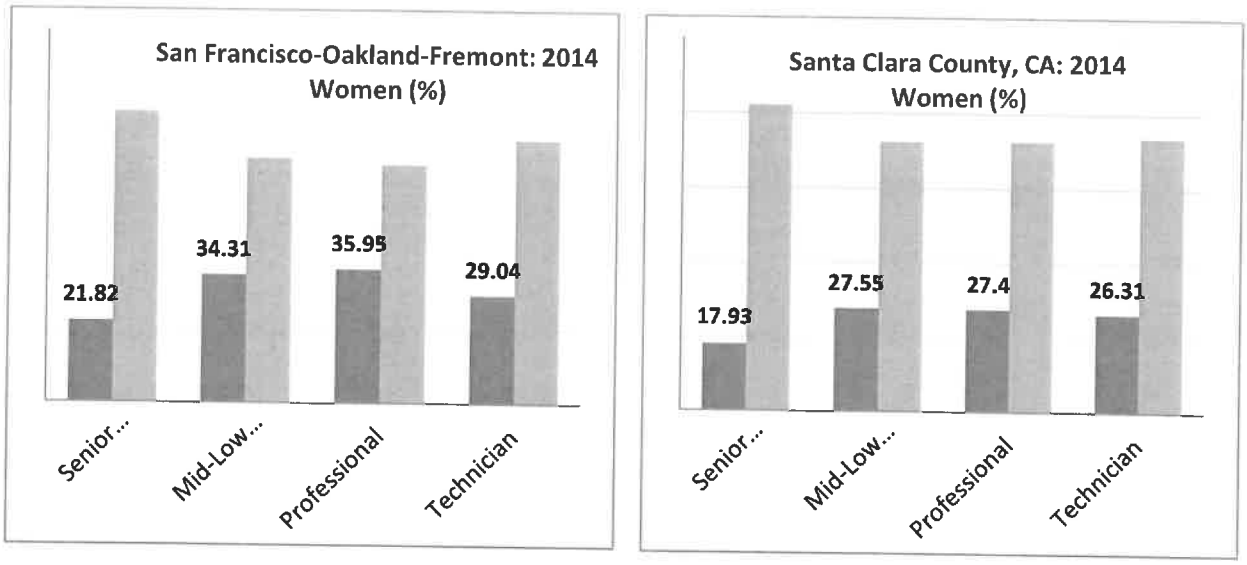
Figure 9 Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

In Figure 9 we examine demographics of employment in the high tech sector in the Silicon Valley area specifically, defined by the geographic region including San Francisco-Oakland-Fremont and one county to the south, Santa Clara. These results show that in high tech in the San Francisco-Oakland-Fremont area, over half of the high tech employment was white (54.9 percent). African Americans and Hispanics were 3.3 and 6.6 percent, respectively. Women comprised 36.7 percent of the total high tech employment.

In Santa Clara County, where many of the top high tech firms are headquartered, whites and Asian Americans each comprised around 45 percent of the total high tech workforce, totaling about 90 percent. That means, on average, of one-hundred workers, only two were African

American and fewer than six were Hispanic. Women made up less than one-third of the county's high tech workforce (28.9 percent). Taken together, these results show under-representation of Black and Hispanic employees in Silicon Valley, and in the heart of Silicon Valley (Santa Clara County) in particular. The same pattern is observed for women.

WOMEN IN LEADERSHIP POSITIONS AND PROFESSIONAL JOBS IN HIGH TECH INDUSTRIES IN SAN FRANCISCO BAY AREA: 2014



	San Francisco-Oakland-Fremont, CBSA		CA Santa Clara County	
	Women (percent)	**Men (percent)**	**Women (percent)**	**Men (percent)**
Executives, Senior Officials and Managers	21.82	78.18	17.93	82.07
First/Mid Officials and Managers	34.31	65.69	27.55	72.45
Professionals	35.95	64.05	27.4	72.6
Technicians	29.04	70.96	26.31	73.69
Total Employment (N)	**72,730**	**125,538**	**74,403**	**182,939**

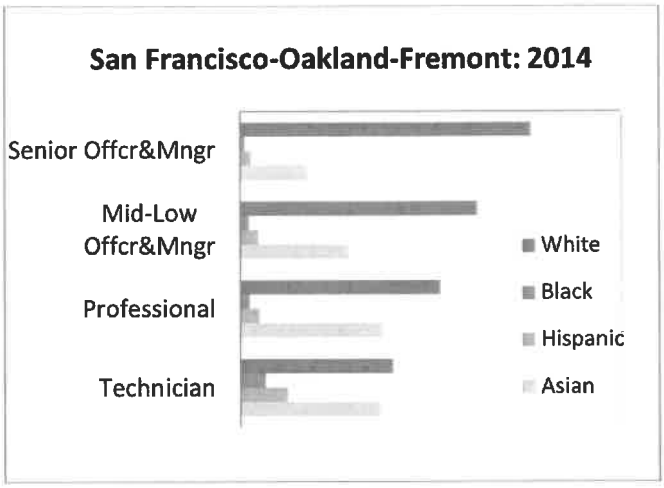
Figure 10

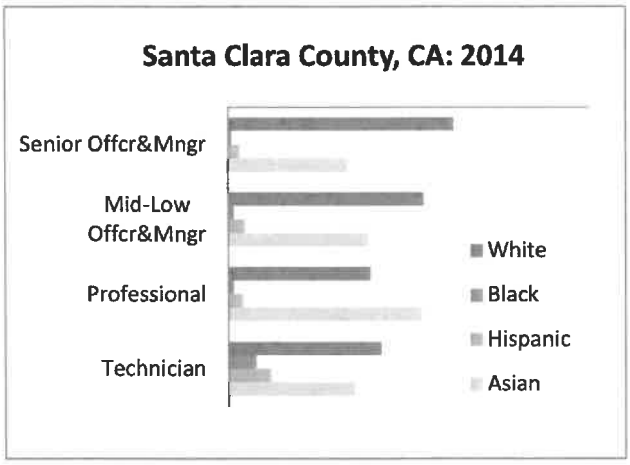
Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

Figure 10 illustrates that in San Francisco-Oakland-Fremont area, women made up 21.8 percent of the total Executives, Senior Officials and Managers and 34.3 percent of the total First/Mid

Officials and Managers in high tech industries. Over one-in-three, or 35.95 percent, of the total Professionals were female and about 29.2 percent of the Technicians were women, both lower than their male counterparts.

LEADERSHIP POSITIONS AND TECHNOLOGY JOBS IN HIGH TECH INDUSTRIES BY RACE AND ETHNICITY IN SAN FRANCISCO BAY AREA: 2014





San Francisco-Oakland-Fremont, CBSA	WHITE	BLACK	HISPANIC	ASIAN AMERICAN
Executive, Senior Officials and Managers	76.41	1.16	2.79	17.86
First/Mid Officer and Manager	62.43	2.31	4.69	28.25
Professionals	52.59	2.45	4.99	37.2
Technicians	40.08	6.59	12.38	36.54
Total Employment (N)	**108,782**	**6,635**	**13,215**	**63,593**
Santa Clara County, CA	**WHITE**	**BLACK**	**HISPANIC**	**ASIAN AMERICAN**
Executive, Senior Officials and Managers	61.9	0.86	3.14	32.92
First/Mid Officials and Managers	53.7	1.48	4.52	38.49
Professionals	39.32	1.52	3.97	51.15
Technicians	42.03	7.82	11.91	34.69
Total Employment (N)	**113,501**	**5,352**	**15,272**	**117,482**

Figure 11

Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

In Santa Clara County, women were 17.9 percent of the Executive, Senior Officials and Managers and 27.6 percent of the First/Mid Officials and Managers. About 27.6 percent of the Professionals were female and about 26.3 percent of the Technicians were women in the county's high tech industries.

In high tech for San Francisco-Oakland-Fremont area, whites make up over three-quarter of the Executive, Senior Officials and Managers (76.4 percent) and Asian Americans around 17.8 percent. African Americans were 2.8 percent and Hispanics were 7.7 percent. For every hundred Professionals, there were 1.5 African Americans and fewer than four Hispanics.

A similar picture was found in high tech in Santa Clara County. The majority of the Executive, Senior Officials and Managers positions were held by either whites (61.9 percent) or Asian Americans (32.9 percent). Over half of the Professional jobs reported in the EEO-1 were staffed by Asian Americans (51.2 percent) and about 40 percent by whites (39.3 percent). African Americans and Hispanics were less represented in both Executive, Senior Officials and Managers positions (0.86 percent and 3.14 percent, respectively) and in Professional jobs (1.52 percent and 3.97 percent, respectively).

Note that while Asian Americans made up large percentages of Professional employees in the the San Francisco metro area (37.2%), and especially in Santa Clara county (51.15%), representation of this demographic group in Executive, Senior Officials and Managers was markedly lower (17.86% and 32.92%, respectively). This preliminary finding may suggest something of a 'glass ceiling' for Asian Americans working in Silicon Valley, one that seems especially pronounced in what we consider to be the heart of the region, Santa Clara County.

III. EXAMINATION OF LEADING HIGH TECH EMPLOYERS IN SILICON VALLEY

The firms analyzed in this section come from a 2015 San Jose Mercury news article, *"Silicon Valley's Top 150 Companies."* [19] The article produced a ranking of high tech firms in the Silicon Valley area based on revenue, profitability and other criteria.[20] To provide a more focused window on diversity in high tech employment, we examined the workforce composition of those tech companies regarded by industry insiders as leaders in the field. From the published list, we selected the first 75 rank-ordered firms that had an EEO-1 on file for 2014, which is the latest year available for EEO1 data at the time of this report.[21] In the case where a firm did not have an EEO-1 report on file, we moved to the next firm on the list.

We then created a data set containing the 2014 EEO-1 report data for the 75 firms and *all of their establishments* located within Silicon Valley. We defined Silicon Valley as all cites within the CBSAs of San Francisco-Oakland-Fremont and of San Jose-Sunnyvale-Santa Clara. A list of these cities included in these two CBSAs is included in Table 5.[22] We examined a total of 230 establishments belonging to the *Top 75 Tech Firms*.

Workforce Composition[23]

In Table 6 we show in frequency and percent the workforce composition of the top 75 ranked firms in Silicon Valley by sex and race-ethnicity. Data come from 2014 EEO-1 reports for the firms and their establishments physically located in the Silicon Valley. In 2014, total employment for these firms aggregated was 209,089.

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[19] April 17, 2015, San Jose Mercury News, http://www.mercurynews.com/business/ci_27932727/sv150-searchable-database-silicon-valleys-top-150-companies.

[20] The article did not describe its ranking methodology.

[21] The NAICS reported in this section are from the Top Ranked 75 Firms in Silicon Valley and do not completely match the definition of high tech industries used elsewhere in this report.

[22] The "Silicon Valley" is generally understood to include the southern half of the San Francisco Peninsula, sections of the East Bay and all of the Santa Clara Valley. This includes parts of the Santa Clara County, San Mateo County and Alameda County. In the prior section the area is defined in terms of two metropolitan areas. For this section, we construct Silicon Valley as the physical location (cities, counties) of the top 75 ranked tech firms and their establishments. This is done in order to get a better fit with the ranking produced by the *San Jose Mercury News* (April 2015).

[23] As another matter of interest, we searched for federal contractor status for all 75 tech firms used in this section. Contractor status is a reporting item on the EEO-1 form. We found that more than half, 57 percent, had at least one current federal contract in 2014. Because federal contractors are now obligated to collect self-reported disability status, data on the employment of people with disabilities in High Tech firms will be available for future study (this is not a data point collected on EEOC surveys).

TABLE 5: LIST OF CITY NAMES - VARIABLE IN EEO-1 DATABASE USED IN SILICON VALLEY REPORTING (CBSA 41860 and 41940)
ALAMEDA
BERKELEY
BRISBANE
BURLINGAME
CAMPBELL
CONCORD
CORTE MADERA
CUPERTINO
EMERYVILLE
FOSTER CITY
FREMONT
HAYWARD
HERCULES
LIVERMORE
LOS GATOS
MENLO PARK
MILPITAS
MOUNTAIN VIEW
NEWARK
OAKLAND
PALO ALTO
PLEASANTON
REDWOOD CITY
RICHMOND
SAN BRUNO
SAN FRANCISCO
SAN JOSE
SAN MATEO
SAN RAFAEL
SANTA CLARA
STANFORD
SUNNYVALE
WALNUT CREEK

N=33

TABLE 6: *2014 EEO-1 DATA FOR TOP RANKED 75 SILICON VALLEY TECH FIRMS AGGREGATED*		
Total Employed	**209,089**	**100%**
Women	62,960	*30%*
Men	146,129	*70%*
Asian American	86,340	*41%*
Black	5,720	*3.%*
Hispanic	12,824	*6.%*
White	99,222	*47%*

N=230 establishments

What is striking in this table is the degree of sex and race segregation. Women comprise just 30 percent of total employment and Asian Americans and Whites comprise 88 percent of all employment.

In Table 6, we see that composition of the select top ranked 75 Silicon Valley tech firms is strongly characterized by sex and race segregation; or, in another words, there is little diversity. But as a point of comparison, what does the workforce composition of the non-tech firms in Silicon Valley look like by sex and race?

Table 7 shows, in frequency and percent, the aggregated workforce composition for all other (non-tech) firms and their establishments also in Silicon Valley.[24] Based on 2014 EEO-1 reports for firms and their establishments, total employment for these firms was 770,290.

[24] After eliminating all firms with a technology industry NAIC, there are 2,939 firms (e.g., unique parent headquarter ID numbers) with a total of 9,278 establishments in the Silicon Valley.

TABLE 7: *2014 EEO-1 DATA FOR ALL OTHER (NON-TECH) SILICON VALLEY FIRMS AGGREGATED*		
Total Employed	**770,290**	**100%**
Women	375,026	*49%*
Men	395,264	*51%*
Asian American	186,493	*24%*
Black	62,789	*8.%*
Hispanic	168,873	*22%*
White	312,627	*41%*

N=9,278 establishments

For these non-high tech firms, employment of women and men is at about parity with 49 percent women and 51 percent men. Whites make up less than half of total employment at 41 percent. Of the remainder, Asian Americans comprise 24 percent, Hispanics 22 percent and African Americans 8 percent.

In Table 8, we examine the distribution of occupations. We specifically examine the ten EEO occupations employers use to report employees' job duties for EEO-1 reporting purposes.

TABLE 8: *2014 EEO-1 DATA FOR TOP RANKED 75 SILICON VALLEY TECH FIRMS AGGREGATED* **(EEO-1 job groups as a percent of total employment)**					
Total Employment	Professionals	Sales	Technicians	Executives & Managers Combined	All Other EEO-1 Occupations
100%	*58%*	*8.%*	*6.%*	*21%*	*6%*

Two occupational types dominate, Professionals at 58 percent and Executives, Senior Officials and Managers combined with First/Mid Officials and Managers at 21 percent. In Table 9, we take the same view but examine the distribution of women and men, whites and non-whites for

the four most populous EEO occupations, Professionals, Sales, Technicians and Executives, Senior Officials and Managers combined with First/Mid Officials and Managers.

TABLE 9: *2014 EEO-1 DATA FOR SELECT TOP RANKED 75 SILICON VALLEY TECH FIRMS AGGREGATED*
(Women/Men and Non-Whites/Whites in EEO occupations)

	Professionals	**Sales**	**Technicians**	**Executives & Managers Combined**
Women	30%	25%	23%	28%
Men	70%	75%	77%	72%
Total	*100*	*100*	*100*	*100*
Asian American	50%	11%	23%	36%
Black	2%	3%	11%	*Less than 1 percent*
Hispanic	4%	6%	12%	1.6%
White	41%	77%	50.%	57%
All other	3%	3%	4%	5%
Total	*100*	*100*	*100*	*100*

Note that Asian Americans again make up a large percentage of Professional employees working at these firms (50%), but a smaller percentage of the management teams (36%). At the same time, African Americans and Hispanics make up a very small percentage of both employment groups (Professionals and Executives and Managers combined). Contrasting again with our aggregated pool of non-high tech firms in Silicon Valley, we see in Table 10, more diversity of occupational types---which we would expect.

TABLE 10: *2014 EEO-1 DATA FOR ALL OTHER (NON-TECH) FIRMS IN SILICON VALLEY AGGREGATED*
(EEO occupations as a percent of total employment)

Total	Prof	Sales	Tech	Blue Collar	Executive-Manager	Service	Clerical
100%	*24%*	*12%*	*5.%*	*16%*	*13%*	*18%*	*12%*

Table 11 shows the occupational composition by sex and race.

TABLE 11: *2014 EEO-1 DATA FOR ALL OTHER (NON-TECH) FIRMS IN SILICON VALLEY AGGREGATED* (Women/Men and Non-Whites/Whites in EEO occupations)							
Total	**Prof**	**Sales**	**Tech**	**Blue Collar***	**Executive-Manager**	**Service**	**Clerical**
Percent of Employment	24%	12%	5.%	16%	13%	18%	12%
Women	56%	54%	49%	16%	43%	50%	73%
Men	44%	46%	51%	84%	57%	50%	27%
Total	100	100	100	100	100	100	100
Asian American	32%	20%	35%	16%	20%	24%	25%
Black	5%	9%	8%	10%	5%	12%	10%
Hispanic	7.5%	25%	15%	40%	10%	34%	20%
White	52%	40%	37%	30%	62%	23%	38%
All Other	3.5%	6%	5%	4%	3%	7%	7%
Total	100	100	100	100	100	100	100

*This combines the EEO occupations Operatives, Laborers & Helpers and Craft Workers.

There is very little occupational segregation (unequal distribution among job groups) by gender within these occupations except for two: Blue-Collar and Clerical. For the remainder there is almost parity for the other EEO-1 occupations. Additionally, there is more race-ethnicity diversity than within the high tech firms examined in the previous table.

APPENDIX FIGURE 1: STEM OCCUPATIONS

Table 1: STEM Occupations, by occupational group

Management
Architectural and engineering managers
Computer and information systems managers
Natural sciences managers
Computer and mathematics
Actuaries
Computer and information research scientists
Computer network architects
Computer network support specialists
Computer programmers
Computer systems analysts
Computer user support specialists
Database administrators
Information security analysts
Mathematical technicians
Mathematicians
Network and computer systems administrators
Operations research analysts
Software developers, applications
Software developers, systems software
Statisticians
Web developers
Computer occupations, all other
Mathematical science occupations, all other
Architecture and engineering
Aerospace engineering and operations technicians
Aerospace engineers
Agricultural engineers
Architectural and civil drafters
Biomedical engineers
Chemical engineers
Civil engineering technicians
Civil engineers
Computer hardware engineers
Electrical and electronics drafters
Electrical and electronics engineering technicians
Electrical engineers
Electro-mechanical technicians
Electronics engineers, except computer
Environmental engineering technicians
Environmental engineers
Health and safety engineers, except mining safety engineers and inspectors
Industrial engineering technicians
Industrial engineers
Marine engineers and naval architects
Materials engineers
Mechanical drafters
Mechanical engineering technicians
Mechanical engineers
Mining and geological engineers, including mining safety engineers
Nuclear engineers
Petroleum engineers
Surveying and mapping technicians
Drafters, all other
Engineering technicians, except drafters, all other
Engineers, all other
Life, physical, and social sciences
Agricultural and food science technicians
Animal scientists
Astronomers
Atmospheric and space scientists
Biochemists and biophysicists
Biological technicians
Chemical technicians
Chemists
Conservation scientists
Environmental science and protection technicians, including health
Environmental scientists and specialists, including health
Epidemiologists
Food scientists and technologists
Forensic science technicians
Forest and conservation technicians
Foresters
Geological and petroleum technicians
Geoscientists, except hydrologists and geographers
Hydrologists
Life, physical, and social science technicians, all other
Materials scientists
Medical scientists, except epidemiologists
Microbiologists
Nuclear technicians
Physicists
Soil and plant scientists
Zoologists and wildlife biologists
Biological scientists, all other
Life scientists, all other
Physical scientists, all other
Education, training, and library
Agricultural sciences teachers, postsecondary
Architecture teachers, postsecondary
Atmospheric, earth, marine, and space sciences teachers, postsecondary
Biological science teachers, postsecondary
Chemistry teachers, postsecondary
Computer science teachers, postsecondary
Engineering teachers, postsecondary
Environmental science teachers, postsecondary
Forestry and conservation science teachers, postsecondary
Mathematical science teachers, postsecondary
Physics teachers, postsecondary
Sales and related
Sales engineers
Sales representatives, wholesale and manufacturing, technical and scientific products

Source: 2010 Standard Occupational Classification (SOC) System, SOC Policy Committee recommendation to the Office of Management and Budget. Healthcare occupations are not included.

APPENDIX TABLE 1: TOP HIGH TECH GEOGRAPHIC AREAS IDENTIFIED FOR POTENTIAL FUTURE RESEARCH		
CBSA TITLE	REPORTING UNITS (N)	TOTAL HIGH TECH EMPLOYMENT (N)
New York-Newark-Jersey City, NY-NJ-PA	2,405	363,444
Los Angeles-Long Beach-Anaheim, CA	1,912	269,452
Washington-Arlington-Alexandria, DC-VA-MD-WV	3,561	266,378
San Jose-Sunnyvale-Santa Clara, CA	890	257,349
Boston-Cambridge-Newton, MA-NH	1,443	224,533
Seattle-Tacoma-Bellevue, WA	867	197,046
Dallas-Fort Worth-Arlington, TX	1,217	189,615
Chicago-Naperville-Elgin, IL-IN-WI	1,462	181,721
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	1,039	130,582
Atlanta-Sandy Springs-Roswell, GA	1,042	128,296

Source: Equal Employment Opportunity Commission, Employer Information Reports (EEO-1 Single, Headquarters, and Establishment Reports, 2014). Numbers may not add up to totals due to rounding.

APPENDIX TABLE 2: NAICS-CODE BASED DEFINITION OF HIGH TECH INDUSTRIES	
4-DIGIT CODE	INDUSTRY LABEL
3254	Pharmaceutical and Medicine Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
3341	Computer and Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
3345	Navigational, Measuring, Electrometrical, and Control Instruments Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
3364	Aerospace Product and Parts Manufacturing
3391	Medical Equipment and Supplies Manufacturing
5112	Software Publishers
5179	Other Telecommunications
5191	Other Information Services
5413	Architectural, Engineering, and Related Services
5415	Computer Systems Design and Related Services
5417	Scientific Research and Development Services
5419	Other Professional, Scientific, and Technical Services

ANNOTATED BIBLIOGRAPHY

1. **"Are There High-Tech Industries or Only High-Tech Firms? Evidence From New Technology-Based Firms"** John R. Baldwin and Guy Gellatly. Microeconomics Division, Statistics Canada December 1998

Far from producing definitive classifications, existing measures of technological advancement are found to be wanting. Classification schemes that rely on a single-measure of technological prowess, as many do, may incorrectly rank industries and/or classify sectors. Second, firms that possess the advanced competencies that contribute to technological prowess are found in many industries, and are not as sector-specific as previous attempts at classification suggest. Simply stated, low-tech industries are not devoid of high tech firms, nor, are high tech industries comprised exclusively of high tech firms. Consequently, broad generalizations at the industry-level may prove dubious. The competency-based approach represents a considerable advance over previous efforts: it formally recognizes the multidimensional nature of technological prowess.

Firms that we identify as advanced in this study have the characteristics associated with new technology-based firms. They are innovative; they introduce new products and processes; they place great emphasis on technology; they appreciate the importance of a skilled workforce, and they train their workers. Industries that might be classified as low-tech on the basis of indices are not devoid of high tech firms—on average, they contain half as many high tech firms as can be found in high tech industries. It should not be claimed that high-knowledge, high tech firms are confined exclusively to these more visible industries.

2. **"How U.S. tech-sector jobs have grown, changed in 15 years"** by Drew DeSilver Pew Research Center, March 2014

Based on data collected from November 2009 to May 2012, about 3.9 million workers — roughly 3 percent of the nation's payroll workforce (Occupational Employment Statistics, BLS) — work in what we might think of as "core" tech occupations — not people who simply use computing technology in their jobs, but whose jobs involve making that technology work for the rest of us. (Occupations involving the installation and repair of telecommunications lines and equipment, as well as computer repairers were excluded.) The chart below shows just how different the structure of 2012's technology industry is from that of 15 years earlier. Some occupations, such as web developers and information security analysts, simply didn't exist back then (at least not under those names). Others have dramatically grown (programmers/software developers, support specialists) or shrunk (computer operators).

3. **"The Joys of Urban Tech: Goodbye, office parks. Drawn by amenities and talent, tech firms are opting for cities"** By Richard Florida Wall Street Journal, Aug. 31, 2012

A generation or so ago, high tech companies were more like factories. They developed proprietary software systems, designed and manufactured chips, built computers, they

deployed big engineering teams and created the infrastructure that made the Internet possible and they needed big suburban campuses to house them.

The changing nature of technology—cloud-based applications in particular—enable new start-ups to succeed more quickly, with smaller teams and much smaller footprints. High tech products and industries are more multidisciplinary than they used to be so success often requires excellence in more than one field of technology and in other lines of business. The companies that succeed are the ones that stay in the closest contact with their end-users and first adopters. Design is central to successful new hardware products Design talent is overwhelmingly concentrated in big cities, with their leading design schools and multiple industries that draw upon such skills. Other areas of high tech are premised less on breakthrough innovations and more on the application of technology to massive new markets in retailing, advertising, media, financial services, education, publishing, communications, fashion and music. Tech companies are dispersing to areas where access to their need for diverse talent can be accommodated.

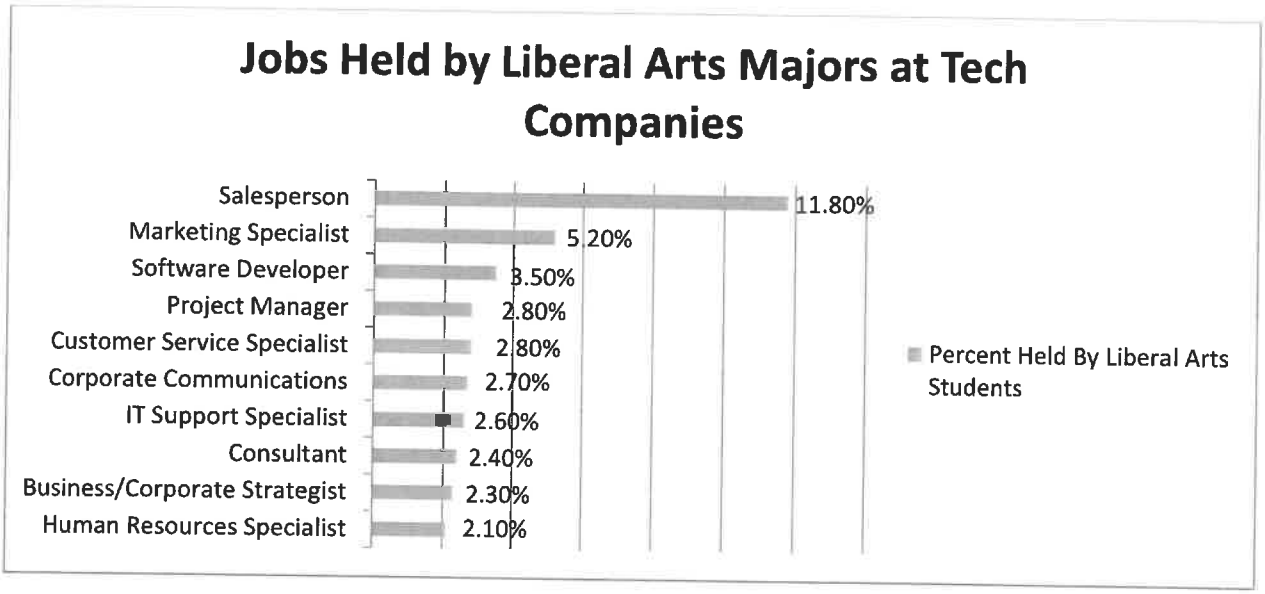
4. **"STEM 101: Intro to Tomorrow's Jobs"** Dennis Vilorio. Occupational Outlook Quarterly; Spring 2014 www.bls.org/ooq

There is no universally agreed-upon definition of STEM. STEM workers use their knowledge of science, technology, engineering, or math to try to understand how the world works and to solve problems. A list of 100 STEM occupations (excluding healthcare) was compiled by several federal agencies; see Appendix Figure I for this list. The BLS projects overall STEM employment to grow about 13 percent 2012-2022, somewhat faster than the 11 percent projected for all occupations. The largest numbers of professional and technical jobs (not fastest growing) are expected to be in software development and applications, computer systems analysis and user support. Software development and systems analysis jobs generally require a Bachelor's Degree while user support requires "some college, no degree (See Appendix TABLE I A for lists of 15 rapidly growing occupations and occupations with the largest number of jobs.)

5. **"Want A Tech Career? LinkedIn Finds 12 Eye-Catching Paths"** by George Anders. Forbes, Tech (August 25, 2015)

LinkedIn data scientist Alice Ma has crunched the numbers. In a new blog post, she highlights 12 eye-catching ways that non-technical strivers can be welcomed into the coders' lair. From 2010 to 2013, hiring of liberal-arts majors in tech companies actually grew 10 percent faster than the rate of job offers to computer-science and engineering majors.

BIBLIOGRAPHY FIGURE I



6. **"Gender Segregation in Fields of Study at Community Colleges and Implications for Future Earnings"** Layla Moughari, Rhiana Gunn-Wright, and Barbara Gault, Ph.D. Institute for Women's Policy Research IPWR#C395 (May 2012)

While men out earn women regardless of occupation, occupational field contributes substantially to the pay gap. Women outnumber men in community colleges, receiving 56.8 percent of associate degrees but men comprise at least seventy percent of graduates in engineering, mathematics, and computer science while women dominate in the lower paying fields.

7. **"Closing the STEM Skills Gap"** by STEM Education Coalition www.stemedcoalition.org

The STEM Coalition meets with legislators, legislative staff, and community leaders to discuss STEM policy and education. The Coalition works with U.S. House STEM Education Caucus. The Coalition recommends "robust and targeted investments" preparing and training elementary and secondary school teachers in "STEM-specific pedagogical knowledge" enabling them to excite students and foster strong student learning in STEM subjects through a strong emphasis on hands-on, inquiry-based learning activities for students from an early age. We should encourage learning through working directly with STEM professionals in internships, and participating in field experiences and STEM-related competitions. Informal education such as museums, maker-spaces, or after school groups – are valuable and essential partners for STEM education improvement

There are almost twice as many job postings in STEM fields as there are qualified applicants to fill them. Half of STEM jobs do not require a traditional four-year degree and pay on average 10

per cent higher than non-STEM jobs.[25] Public/private partnerships are recommended to create a suitable workforce.

8. **Science, Technology, Engineering, and Mathematics (STEM) Education: A Primer** by Heather B. Gonzalez and Jeffrey J. Kuenzi. Congressional Research Service, 11-15-2012

Graduate enrollments in science and engineering (S&E) grew 35 percent over the last decade. S&E enrollments grew for groups generally under-represented in S&E, increase by demographic group:

- Hispanic/Latino, 65 percent
- American Indian/Alaska Native, 55 percent
- African American students 50 percent

Analysts have identified between 105 and 252 STEM education programs or activities at 13 to 15 federal agencies.

According to the U.S. Census Bureau, the percentage of U.S. bachelor's degree holders with undergraduate degrees in science and engineering (S&E) was 36.4 percent in 2009 (approximately 20 million people).

The NSF estimates that the percentage of bachelor's degrees in S&E fields has held relatively constant—at between approximately 30 percent and 35 percent of all bachelor's degrees—for the past four decades. However, because the U.S. college-age population grew during these years, the total number of S&E bachelor's degrees awarded annually more than doubled between 1966 and 2008 (from 184,313 to 494,627). Since 1966, the percentage of doctorates in S&E fields has ranged between approximately 56 percent and 67 percent of all graduate degrees (where a field of study has been reported). The total number of doctoral degrees in S&E fields has nearly tripled, growing from 11,570 in 1966 to 32,827 in 2008.33 Graduate enrollments show similar upward trends.

In the decade between 2000 and 2010, graduate enrollments in S&E fields grew by 35 percent. Further, among U.S. citizens and permanent residents, S&E graduate enrollments among Hispanic/Latino, American Indian/Alaska Native, and black/African American students grew at a higher rate than that of whites (not of Hispanic origin) and Asian Americanss.39 While women account for relatively small percentages of degree recipients in certain STEM fields (only 18.5 percent of bachelor's degrees in engineering went to women in 2008)38 they accounted for 77.1 percent of the psychology degrees and 58.3 percent of the biological and agricultural sciences degrees in 2008,[26]

[25] Note from RT: This is disputed in other articles cited here. The focus on elite degrees and hostile atmosphere may contribute to the shortage. The perceived shortage in turn may motivate the higher salaries, absent which salaries would drop.

[26] Data from the National Science Foundation, National Center for Science and Engineering Statistics

Foreign students earn roughly one-third of all U.S. S&E doctoral degrees and earn half (or more) of U.S. doctoral degrees in the specific fields of engineering, physics, computer sciences, and economics. In 2009, there were 611,629 graduate students in science and engineering fields in the United States. Of these 168,850 (27.6 percent) were temporary residents.[27]

9. **"How tech companies compare in employee diversity"** FORTUNE August 29, 2014

At least 14 high tech companies have released data on their gender, racial, and ethnic diversity. Fortune ranked them in individual categories (leadership team, technical workers) and overall diversity. These graphs are shown in Appendix Figure II. Here's how they stacked up, overall by Fortune's measure:

• LinkedIn • Apple • EBay • Indiegogo & Yahoo (tied)	• Pinterest • Pandora • Facebook • Intel & Google (tied)	• Twitter • Cisco • Hewlett-Packard • Microsoft

10. **"Does the Tech Industry Even Deserve Women?"** By Cecilia D'Anastasio https://broadly.vice.com/en_us/article/does-the-tech-industry-even-deserve-women September 6, 2015

Women and minorities in tech have a special responsibility; in addition to their jobs, minorities in tech are employed as demographic icons. In that capacity, they often must defend their identity against a culturally-sanctioned exclusivity. That job never pays. Feminists weigh being tolerant of abuse or out of a job. Harassment happens, startlingly often and unprovoked, and it can feel it comes with the territory of tech jobs.

The problem isn't necessarily that women don't care about programming, or that women in tech aren't measuring up, according to *Lean Out* contributors, the problem is that internalized misogyny and financially-reinforced tokenism runs through the veins of tech. Women in tech are the canary in the coal mine. When the canary starts dying you know the environment is toxic. Instead, the tech industry is looking at the canary, wondering why it can't breathe, saying 'Lean in!

[27] National Science Board, Science and Engineering Indicators: 2012, NSB 12-01, National Science Foundation, January 13, 2012, p. 2-28.

11. **Athena Factor 2.0: Accelerating Female Talent in Science, Engineering & Technology** by Sylvia Ann Hewlett and Laura Sherbin with Fabiola Dieudonné, Christina Fargnoli, and Catherine Fredman TalentInnovation.org, 2014

In 2008, when we published *The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology*, our data showed that while the female talent pipeline in SET was surprisingly robust, women were dropping out of the field in droves. Over time, fully 52 percent of highly qualified women working for SET companies quit their jobs. While 80 percent of U.S., 87 percent of Brazilian, 90 percent of Chinese and 93 percent of Indian SET women say they love their work. However, a sizable proportion say they feel stalled and say they are likely to quit their jobs within a year. Women who say they are likely to quit within a year: 32 percent U.S.; 22 percent Brazil; 30 percent China; 20 percent India.

Looking at the barriers to SET women's advancement through a lens refined by our recent we see promising levers for change. The most obvious solution: sponsorship. Sponsors help their protégés crack the unwritten code of executive presence, improving their chances of being perceived as leadership material. Most important to the companies employing them, sponsors help women get their ideas heard.

Our research shows that when SET women are fully engaged, and when leadership creates the speak-up culture wherein their ideas might be heard, companies enjoy a "diversity dividend" that translates into increased market share and entry into altogether new markets.

12. **Why So Few? Women in Science, Technology, Engineering, and Math. Catherine Hill, Ph.D. Christianne Corbett Andresse St. Rose, Ed.D. AAUW 2010, updated 2015 in Solving the Equation and reported The Stats On Women In Tech Are Actually Getting Worse by** Emily Peck, Executive Editor, Business and Technology **Huffington Post,** Updated Mar 27, 2015

In 2013, just 26 percent of computing jobs in the U.S. were held by women, down from 35 percent in 1990, according to the study released Thursday by the American Association of University Women. In 2013, more than half of the biological scientists in the U.S. were women, compared to 42 percent in 1990.

Prejudices tend to make their way into the hiring process. .Men are twice as likely as women to be hired for a job in mathematics when the only difference between candidates is gender, (Proceedings of the National Academy of Sciences March 10, 2014).

At Google, women make up 30 percent of the company's overall workforce, but hold only 17 percent of the company's tech jobs. At Facebook, 15 percent of tech roles are staffed by women. At Twitter, it's a laughable 10 percent. For non-technical jobs at Twitter (think marketing, HR, sales), the gender split is 50-50.

Diversity needs to be made a clear priority at companies. That happens only when diversity moves out of workshops and becomes factored into the hiring managers' bottom lines.

13. **"How stereotypes impair women's careers in science"** by Ernesto Reubena, Paola Sapienzab, and Luigi Zingalesc Proceedings of the National Academy of Sciences, January 31, 2014

Without provision of information about candidates other than their appearance, men are twice more likely to be hired for a mathematical task than women. If ability is self-reported, women still are discriminated against, because employers do not fully account for men's tendency to boast about performance. Providing full information about candidates' past performance reduces discrimination but does not eliminate it. Implicit stereotypes (as measured by the Implicit Association Test) predict not only the initial bias in beliefs but also the suboptimal updating of gender-related expectations when performance-related information comes from the subjects themselves.

14. **"Why are women leaving the tech industry in droves?"** by Tracey Lien Los Angeles Times Feb.22, 2015

Reasons include a "hostile" male culture, a sense of isolation and lack of a clear career path. The attitudes holding them back are subtle, and hence more difficult to challenge.

"The continuous pattern of all these people treating me like I didn't know what was going on, or excluding me from conversations and not trusting my assertions, all these things added up and it felt like there was an undercurrent of sexism," Tracy Chou said.

That's one difficulty in tackling the problem, said Alaina Percival of Women Who Code "They're [things that are] so small you'd never even complain about them," Percival said. "But they happen day after day. They're the kind of things that separate and exclude you from the team...". So far, no company has found a solution for retaining women.

15. **"Stopping the Exodus of Women in Science"** by Sylvia Ann Hewlett, Carolyn Buck Luce, Lisa J. Servon. Harvard Business Review June 2008

Fifty-two percent of female scientists, engineers, and technologists abandon their careers! Business leaders decry the shortage and lobby for more H-1B visas although the talent they seek is available. Research by The Center for Work-Life Policy shows that 41 percent of qualified scientists, engineers and technologists are women at the lower rungs of corporate ladders but more than half quit their jobs. Five reasons appear to account for the loss: workplace hostility, isolation, conflict between women's preferred work rhythms and the "firefighting" work style generally rewarded, long hours and travel schedules conflict with women's heavy household management workload, and women's lack of advancement in the professions and corporate ladders. If corporate initiatives to stem the brain drain reduce attrition by 25 percent there would be 220 thousand additional highly qualified female STEM workers.

16. **"Why Women Quit Science"** on line title **"She Wanted to Do Her Research. He Wanted to Talk 'Feelings.'"** by A. Hope Jahren. New York Times (March 4, 2016)

Women are no longer a race and ethnic within higher education; women's enrollment in graduate education in the United States has been greater than men's for each of the last 30 years; as of 2012, there were 13 women enrolled for every 10 men. Yet, in physical sciences, seven B.S. degrees are granted to women for every 10 granted to men; three M.S. degrees granted to women for every five granted to men; one Ph.D. degree granted to a woman for every two granted to men. The absence of women is progressive and persistent — despite more than 20 years of programs intended to encourage the participation of girls and women.

Women reported both isolation and intimidation as barriers blocking their scholarly path; and while 23 percent of freshmen reported not having experienced these barriers, only 3 percent of seniors did. Few studies exist, but in a survey of 191 female fellowship recipients, 12 percent indicated that they had been sexually harassed as a student or early professional. Sexual harassment is very rarely publicly punished when reported, and then only after a pattern of relatively egregious offenses. And, it never stops.

17. **"The 5 Biases Pushing Women Out of STEM"** by Joan C. Williams Harvard Business Review (March 24, 2015)

Bias, not pipeline issues or personal choices pushes women out of science. Bias functions differently depending on race and ethnicity. Based on a survey and in-depth interviews of female scientists (557 and 60 respectively):

- Two-thirds of women report having to prove themselves over and over; their success discounted and their expertise questioned.
    - Three-fourths of Black women reported this phenomenon
- Thirty-four percent reported pressure to play a traditionally feminine role, including 41 percent of Asian women.
    - Fifty-three percent reported backlash from speaking their minds directly or being outspoken or decisive.
    - Women, particularly Black and Latina women, are seen as angry when they fail to conform to female stereotypes
- Almost two thirds of women with children say their commitment and competence were questioned and opportunities decreased after having children.
- Three fourths of women surveyed said that women in their workplace supported each other; one fifth said they felt as if they were competing with women colleagues for "the woman spot".
- Isolation is a problem: 42 percent of Black women, 38percent of Latinas, 37 percent of Asian women and 32 percent of White women agreed that socializing with colleagues negatively affect perceptions of their competence.

18. **"What's Holding Women Back in Science and Technology Industries" Center for Talent Innovation and Hewlett Consulting Partners LLC** Harvard Business Review, September 2015

New research from the Center for Talent Innovation shows that U.S. women working in SET fields are 45 percent more likely than their male peers to leave the industry within the year. Over 80 percent of U.S. women love what they do; in Brazil, China, and India, the numbers are close to 90 percent. Over three-quarters (76 percent) of U.S. women consider themselves "very ambitious," as do 92 percent of Chinese and 89 percent of Indian SET women. Yet, they feel stalled, blocked from contributing to their full potential, and stymied by bias and a double standard. They feel marginalized by the environment of "arrogant nerds" and "hard hat culture". Thirty-two percent of U.S. women say they are likely to leave within a year, as do 22 percent of Brazilian women, 30 percent of women in China, and 20 percent in India.

19. **"The Hiring Dilemma for High-tech Firms: 'Make vs. Buy'"** Knowledge @ Wharton http://knowledge.wharton.upenn.edu/article/the-hiring-dilemma-for-high-tech-firms-make-vs-buy/ (Nov 02, 2005)

The article reports research findings and recommendations. HR strategy complements technology strategy; in a fast-paced industry, product life cycles are growing shorter. Firms are facing more opportunities for change and more adjustments to the workforce. When skills need to be adjusted, it pays to buy the skills instead of developing them.

The opposite is true for slower moving industries operating in marketplaces with less change — these findings could be significant for human resource management strategies. As the pace of technological change has quickened, and as global competition has shortened product life cycles, firms have had to rethink their technology investment strategies and their human resource management practices in order to remain competitive.

A classic example of this phenomenon is Hewlett Packard over the last 20 years. They had such a reputation for use of internal labor markets, where they hired employees at an early stage and then developed them throughout their careers. But now they are operating more on the spot market. In order to keep pace with other technology firms, they hire on the outside.[28]

Technology firms in short product life markets, and thus with high R&D spending, must have a mix of engineers dominated by the new skills required for the new technology with a small emphasis on engineers with experience on the last generation of technology. High tech firms need to balance the two strategies; experienced workers have firm-specific knowledge that

[28] There is substantial pressure for educators to train students in specific skills rather than focus on developing fundamental abilities, and has been noted for decades. The tendency for companies to externalize the cost of firm specific training is also a cost-cutting strategy. These workers are shed with the next product cycle.

can't be replaced on the outside market, but when you are not investing a lot in developing the skills of a work force, employees will leave.

20. **"Immigration and America's high tech industry: The jobs machine"** The Economist April 13, 2013

A bunch of other Silicon Valley types are planning to launch a well-funded political-advocacy group to lobby for more visas for skilled immigrants. Applications for this year's quota of 65,000 "H-1B" visas for such workers began on April 1st. In less than a week they were oversubscribed. The proportion of start-ups in Silicon Valley founded by immigrants has fallen from 52 percent to 44 percent since 2005.

High tech employment growing fastest in places you might not associate with bits and bytes. Some are being created by start-ups local to the area. Other companies in tech hubs have opened faraway offices to tap new pools of skilled labor. Logistics matter, too. Bloom Energy decided to open a factory in Delaware to make it easier to get its fuel cells, which are the size of a small car, to customers on the east coast. And View, another immigrant-founded Californian start-up, has opened its only factory in Mississippi, because it is a good place from which to ship stuff to the rest of America.

High tech jobs matter not just to software engineers, scientists and the folk working in factories, estimates indicate that for every job created in the high tech sector, another 4.3 jobs emerge over time in the local economy. That is more than three times the local "multiplier" for manufacturing jobs.[29]

21. **"The STEM Workforce: An Overview"** Fact Sheet 2014, AFL-CIO Department for Professional Employees.

This fact sheet outlines the employment and earning trends in STEM occupations; unionization in STEM fields; the location of STEM jobs; gender, race, and ethnicity in STEM; and the challenges offshoring and U.S. guest worker visa programs pose for U.S. STEM workers. Data is drawn from the U.S. Census, American Community Survey, Bureau of Labor Statistics and other public sources.

[29] This would make the multiplier for manufacturing very low; The key is in how the "local" economy is defined and the wage level of the manufacturing (vs. tech) jobs. It may be the case that the multiplier effect is geographically larger in manufacturing in high tech.

22. **"About Face: Most Companies say they want to attract a diverse workforce, but few deliver."** by Claire Cain Miller. New York Times Magazine, The Work Issue, Feb. 28,2010

GapJumpers was formed to recruit tech workers in Silicon Valley based on applicant performance in challenges that mimic job tasks. The goal was to increase diversity by eliminating the effect of elite colleges in the hiring process. But, companies still received applicant names and photos in addition to test results. It wasn't until the company adopted the practice used by symphony orchestras, anonymity for all candidates and selection based on test results alone, that non-White applicants increased from 20 to 60 percent of those chosen for an interview. The tech industry is well suited to this approach as jobs require the ability to produce something that can be evaluated by peers.

There is some truth to the "pipeline" theory attributing lack of employment diversity in tech industries to lack of applicant diversity and self-selection of minorities and women away from STEM fields. Yet, nearly 9 percent of graduates from the top 25 computer science programs are Black, Latino, or Native American while only 5 percent of the large tech firms are from one of these groups. There are "a handful" of Silicon Valley start-ups like Gild and Textio working on technological fixes to increase diversity in hiring.

BIBLIOGRAPHY TABLE I A:
Selected STEM occupations with many job openings, projected 2012–22

Occupation	Job openings, projected 2012–22	Employment		Median annual wage, May 2013	Typical entry-level education[1]
		2012	Projected 2022		
Software developers, applications	218,500	613,000	752,900	$92,660	Bachelor's degree
Computer systems analysts	209,600	520,600	648,400	81,190	Bachelor's degree
Computer user support specialists[2]	196,900	547,700	658,500	46,620	Some college, no degree
Software developers, systems software	134,700	405,000	487,800	101,410	Bachelor's degree
Civil engineers	120,100	272,900	326,600	80,770	Bachelor's degree
Computer programmers	118,100	343,700	372,100	76,140	Bachelor's degree
Sales representatives, wholesale and manufacturing, technical and scientific products[2]	111,800	382,300	419,500	74,520	Bachelor's degree
Network and computer systems administrators	100,500	366,400	409,400	74,000	Bachelor's degree
Mechanical engineers	99,700	258,100	269,700	82,100	Bachelor's degree
Computer and information systems managers[3]	97,100	332,700	383,600	123,950	Bachelor's degree
Industrial engineers	75,400	223,300	233,400	80,300	Bachelor's degree
Architectural and engineering managers[3]	60,600	193,800	206,900	128,170	Bachelor's degree
Web developers	50,700	141,400	169,900	63,160	Associate's degree
Electrical engineers	44,100	166,100	174,000	89,180	Bachelor's degree
Computer network architects[3]	43,500	143,400	164,300	95,380	Bachelor's degree

1 Unless otherwise specified, occupations typically require neither work experience in a related occupation nor on-the-job training to obtain competency.

2 In addition to the education specified, this occupation typically requires moderate-term on-the-job training for workers to obtain competency.

3 In addition to the education specified, this occupation typically requires 5 years or more of work experience in a related occupation.

Source: U.S. Bureau of Labor Statistics, Employment Projections program (employment, projections, and education data) and Occupational Employment Statistics survey (wage data).

BIBLIOGRAPHY TABLE I B:
Selected STEM occupations with fast employment growth, projected 2012–22

Occupation	Employment growth, projected 2012–22 (percent)	Employment		Median annual wage, May 2013	Typical entry-level education[1]
		2012	Projected 2022		
Information security analysts[2]	37 percent	75,100	102,500	$88,590	Bachelor's degree
Operations research analysts	27	73,200	92,700	74,630	Bachelor's degree
Statisticians	27	27,600	34,900	79,290	Master's degree
Biomedical engineers	27	19,400	24,600	88,670	Bachelor's degree
Actuaries[3]	26	24,300	30,600	94,340	Bachelor's degree
Petroleum engineers	26	38,500	48,400	132,320	Bachelor's degree
Computer systems analysts	25	520,600	648,400	81,190	Bachelor's degree
Software developers, applications	23	613,000	752,900	92,660	Bachelor's degree
Mathematicians	23	3,500	4,300	102,440	Master's degree
Software developers, systems software	20	405,000	487,800	101,410	Bachelor's degree
Computer user support specialists[4]	20	547,700	658,500	46,620	Some college, no degree
Web developers	20	141,400	169,900	63,160	Associate's degree
Civil engineers	20	272,900	326,600	80,770	Bachelor's degree
Biological science teachers, postsecondary	20	61,400	73,400	75,740	Doctoral or professional
Environmental science and protection technicians, including health	19	32,800	38,900	41,700	Associate's degree

1 Unless otherwise specified, occupations typically require neither work experience in a related occupation nor on-the-job training to obtain competency.
2 In addition to the education specified, this occupation typically requires less than 5 years of work experience in a related occupation.
3 In addition to the education specified, this occupation typically requires long-term on-the-job training for workers to obtain competency.
4 In addition to the education specified, this occupation typically requires moderate-term on-the-job training for workers to obtain competency.
Source: U.S. Bureau of Labor Statistics, Employment Projections program (employment, projections, and education data) and Occupational Employment Statistics survey (wage data).

February 13, 2019

The Honorable Roger Wicker
Chairman
Senate Committee on Commerce, Science, & Transportation
512 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Maria Cantwell
Ranking Member
Senate Committee on Commerce, Science, & Transportation
425 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Lindsey Graham
Chairman
Senate Committee on the Judiciary
224 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Dianne Feinstein
Ranking Member
Senate Committee on the Judiciary
152 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Frank Pallone, Jr
Chairman
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Greg Walden
Ranking Member
House Committee on Energy and Commerce
2322 Rayburn House Office Building
Washington, DC 20515

The Honorable Jerrold Nadler
Chairman
House Committee on the Judiciary
2141 Rayburn House Office Building
Washington, DC 20515

The Honorable Doug Collins
Ranking Member
House Committee on the Judiciary
2141 Rayburn House Office Building
Washington, DC 20515

Dear Chairs Wicker, Graham, Pallone, and Nadler, and Ranking Members Cantwell, Feinstein, Walden and Collins:

We, the undersigned members of the civil rights and racial justice community, write to ensure that civil rights retain a fundamental place in the ongoing online privacy debate, hearings, and legislation in your committees.

For over 50 years, federal law has prohibited discrimination and our economy has thrived as more people had opportunities to pursue their dreams. Our groups have been at the forefront of ensuring that civil and human rights, equity, and equal opportunity are recognized and respected as technology, society, and the economy evolve. To further

that effort, many of the undersigned organizations supported the Civil Rights Principles for the Era of Big Data in 2014.[1]

In the years since 2014, our groups have continued to raise the alarm as data security and privacy abuses have disproportionately harmed marginalized communities, especially communities of color. These harmful practices include:

- Deceptive voter suppression and misinformation targeting African Americans.
- Housing discrimination and digital redlining.
- Employment discrimination through profiling and targeted advertising.
- Predatory lending, such as for student loans and payday loans.
- Exploitation of poor tech literacy through misleading notice and choice practices.
- Facilitation of discriminatory government surveillance and policing practices.

These practices violate the Civil Rights Principles for the Era of Big Data, which underscore the importance of ensuring fairness in automated decisions, enhancing individual control of personal information, and protecting people from inaccurate data.

Civil rights protections have existed in brick-and-mortar commerce for decades. It is time to ensure they apply to the internet economy as well. Platforms and other online services should not be permitted to use consumer data to discriminate against protected classes or deny them opportunities in commerce, housing, and employment, or full participation in our democracy. Companies also should be required to be transparent about their collection and use of personal information in automated decisionmaking, and to anticipate and protect against discriminatory uses and disparate impacts of big data.

To address these concerns, any new privacy legislation should be consistent with the Civil Rights Principles for the Era of Big Data:

- *Stop High-Tech Profiling.* New surveillance tools and data gathering techniques that can assemble detailed information about any person or group create a heightened risk of profiling and discrimination. Clear limitations and robust audit mechanisms are necessary to make sure that if these tools are used it is in a responsible and equitable way.

- *Ensure Fairness in Automated Decisions.* Computerized decisionmaking in areas such as employment, health, education, and lending must be judged by its impact on real people, must operate fairly for all communities, and in particular

[1] The Leadership Conference on Civil and Human Rights, *Civil Rights Principles for the Era of Big Data*, (Feb. 27, 2014), https://civilrights.org/civil-rights-principles-era-big-data/.

must protect the interests of those that are disadvantaged or that have historically been the subject of discrimination. Systems that are blind to the preexisting disparities faced by such communities can easily reach decisions that reinforce existing inequities. Independent review and other remedies may be necessary to assure that a system works fairly.

- *Preserve Constitutional Principles.* Search warrants and other independent oversight of law enforcement are particularly important for communities of color and for religious and ethnic minorities, who often face disproportionate scrutiny. Government databases must not be allowed to undermine core legal protections, including those of privacy and freedom of association.

- *Enhance Individual Control of Personal Information.* Personal information that is known to a corporation — such as the moment-to-moment record of a person's movements or communications — can easily be used by companies and the government against vulnerable populations, including women, the formerly incarcerated, immigrants, religious minorities, the LGBT community, and young people. Individuals should have meaningful, flexible control over how a corporation gathers data from them, and how it uses and shares that data. Non-public information should not be disclosed to the government without judicial process.

- *Protect People from Inaccurate Data.* Government and corporate databases must allow everyone — including the urban and rural poor, people with disabilities, seniors, and people who lack access to the Internet — to appropriately ensure the accuracy of personal information that is used to make important decisions about them. This requires disclosure of the underlying data, and the right to correct it when inaccurate.

Privacy rights are civil rights. Protecting privacy in the era of big data means protecting against uses of consumer information that concentrate harms on marginalized communities while concentrating profits elsewhere. Both individuals and the government must be empowered to enforce these fundamental principles of civil rights through agency rulemaking authority, strong enforcement, and the availability of effective legal redress. Historically, marginalized communities could not rely on government actors to protect their rights; this is why most civil rights laws contain a private right of action. **Privacy legislation that does not reflect these values should be rejected.**

It is long past time to see effective privacy laws for commercial data practices established in the United States. We look forward to offering our expertise and vision as the debate continues and your committees craft legislation to protect everyone's rights and create a more just and equitable society.

Sincerely,

Access Humboldt
Access Now
ACLU
Action Center on Race and Equity (ACRE)
Algorithmic Justice League
Asian Americans Advancing Justice – AAJC
Campaign for a Commercial-Free Childhood
Center for Democracy & Technology
Center for Digital Democracy
Center for Media Justice
Center on Privacy & Technology at Georgetown Law
Color Of Change
Common Cause
Common Sense Media
Consumer Action
Consumer Federation of America
Consumer Watchdog
Electronic Privacy Information Center
Ella Baker Center for Human Rights
Fight for the Future
Free Press Action
Human Rights Campaign
Lawyers' Committee for Civil Rights Under Law
Media Alliance
Media Mobilizing Project
NAACP
National Consumer Law Center (on behalf of its low income clients)
National Hispanic Media Coalition
National Organization for Women (NOW) Foundation
National Urban League
New America Public Interest Technology
New America's Open Technology Institute
Open MIC (Open Media and Information Companies Initiative)
Organization United for Respect
Partnership for Working Families
Public Citizen
Public Knowledge
Ranking Digital Rights
Stop Online Violence Against Women
The Leadership Conference on Civil and Human Rights
UnidosUS
United Church of Christ, OC Inc.
Upturn