ONE**AMERICA**
With Justice for All

CREATING QUALITY JOBS FOR ALL IN WASHINGTON'S TECH SECTOR

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PREFACE:
JOIN THE NORTHWEST PAPERS DIALOGUE

OneAmerica is the largest organizing, civic engagement, and advocacy organization rooted in Washington's immigrant and refugee communities. We play an active and leading role pressing for racial equity and progressive change in immigrant rights, education and early learning, voting rights, and immigrant integration.

With support from the Northwest Area Foundation, OneAmerica is publishing a series of papers titled the Northwest Papers, which focus on three inter-connected problems in Washington state: rising economic instability, the decline of quality jobs, and the persistent reproduction of inequality in our institutions. This paper, *Creating Quality Jobs for All in Washington's Tech Sector*, provides an illuminating profile of the Tech sector, a major driver of economic growth and wealth generation. But who has access to these economic benefits, and who does not?

Our paper addresses this core question by calling out the structural and institutional inequities within the Tech sector that limit opportunities for career growth and achievement for women, Black, Indigenous, People of Color, immigrants, and refugees. A large share of the tech workforce is employed in positions with precarious economic stability, either as low-wage warehouse workers or through staffing agencies or gig work. Women and BIPOC community members are grossly underrepresented relative to society overall owing to internal workplace discrimination and cultures in the tech sector, compounding the failure of educational and workforce pipelines into the sector. H-1B workers hired through staffing agencies are often grossly underpaid relative to their occupational peers and contract and gig workers face greater job insecurity, fewer benefits, and lower pay than regular employees in the sector. Women of all races remain sidelined from the most prestigious and well-paying jobs.

Gender and racial inequities in the tech workforce are also rooted in a range of historical, economic, and political causes. These inequities are perpetuated by ongoing institutional sexism, racism and poverty in society and have created barriers to equal employment opportunities. For example, sub-groups of immigrants and refugees face a range of ongoing barriers such as high drop-out rates in K-12 education, underemployment of college graduates in low wage jobs, a dearth of adult language learning programs for individuals with technology experience, and little access to professional networking opportunities.

Creating Quality Jobs for All in Washington's Tech Sector proposes achievable economic and workforce policy recommendations to address these problems. These

recommendations are designed to generate dialogue and inspire action. We call on industry leaders and policymakers to create — in a meaningful and systemic way — opportunity and advancement for women, BIPOC, and immigrant workers.

As the authors of the report point out — addressing these workforce issues is good both for the economic well-being of Washington workers and families and the tech sector's bottom line. Washington's workforce and economic development policies must focus its resources on improving job quality and reducing inequities, including in the tech sector. King County and the City of Seattle have an important role to play in this effort, with its high concentration of tech companies and workers. We invite you to become an active participant in an ongoing and spirited dialogue. Join us in shaping and implementing the solutions our communities are demanding.

Rich Stolz
Executive Director – Emeritus
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EXECUTIVE SUMMARY
CREATING QUALITY JOBS FOR ALL IN WASHINGTON'S TECH SECTOR

INTRODUCTION

This report is for workers, policymakers, and key stakeholders; it provides a fresh perspective and understanding of the Seattle-area tech workforce and its structural and institutional inequities. Far from being monolithic in structure, the sector encompasses a wide variation in wages, occupations, and job quality. While several previous studies of the tech sector have focused on its size, breadth, earnings, and economic impacts, most do not focus on the problems of poor job quality and workforce inequities. This paper calls out the structural and institutional gender and race inequities within the tech sector, provides an alternative narrative about this workforce, and suggests achievable economic and workforce policy recommendations to address these problems.

The technology sector, with its unprecedented wealth and economic concentration, can provide good quality jobs including living wages, comprehensive benefits, career pathways, wealth building opportunities, and a fair and engaging workplace for all tech workers. Women, Black, Indigenous, and people of color (BIPOC) communities should be equitably represented in the industry. All tech workers need consistency and security in employment, income, and financial well-being over time and that both industry leaders and policymakers should address, in a meaningful and systemic way, the institutional inequities and unequal representation, opportunities and advancement it provides to women, BIPOC, and immigrant workers. With these goals in mind, our recommendations are designed to generate dialogue and action among key stakeholders, advocates, and policymakers.

TECH SECTOR AND WORKFORCE

While Washington is host to thousands of technology companies, Amazon and Microsoft are the dominant players with a combined market capitalization of over $3 trillion. A dense web of small and medium-sized businesses in Washington engage in activities including software publishing, web and mobile applications, cloud computing, and computer services. The sector's core activities are interwoven with a range of temporary staffing agencies, university and public-sector research centers, educational institutions, and investment sources such as angel, venture capital, and private equity.

In 2019, Washington's technology sector employed 245,900 workers at companies engaged in one or more of four subsectors, including business services, electronic retail, internet services, and software publishing. This includes all workers directly employed by the big-four tech companies in the Seattle area: Amazon (including warehouse workers), Microsoft, Google, and Facebook, as well as other tech companies, but excludes workers outside of the tech sector, such as those performing tech-related work in all the other sectors of the state economy.

Between 2013 and 2019, tech-sector employment grew at a rapid pace. Today, Amazon (80,000 employees) and Microsoft (58,000 employees) are the largest tech sector employers in Washington, with more than 55 percent of the total workforce. Amazon has become our state's largest employer.

WORKFORCE INEQUITIES IN THE TECH SECTOR

While tech companies have publicly committed to doing better when it comes to hiring and promoting more women and people of color, deep racial and gender disparities persist within the technology sector and workforce. These disparities are due to societal and workforce pipeline issues but also to a toxic "boys' club" culture in the tech industry.

The actual job quality, wages, benefits, and opportunities for career advancement of women, BIPOC, immigrants, and refugees tell a different story than the popular narrative that all tech workers hold high wage, high quality jobs. H-1B visa workers who play an important role in the sector are often paid less than native-born workers. The tech-sector also employs significant numbers of workers in jobs classified as contract or gig work where they face greater job insecurity, fewer benefits, and lower pay than regular employees in the sector. Women of all races remain sidelined from the most prestigious and well-paying jobs in tech and are often steered into lower prestige tracks instead of advancing into senior technical roles.

While some foreign-born sub-groups such as Indians and Chinese workers are well-represented in the tech workforce, others remain under-represented, with most immigrant and refugee community members, including those with foreign technology credentials, struggling to find their way into the technology sector.

Policymakers working with industry and community stakeholders can address these issues by targeting new investments, enacting policies to improve poor quality jobs, and addressing inequities in our education and workforce systems. We need to dismantle institutional barriers for women and BIPOC communities in our tech-labor market.

The task of expanding employment and educational opportunities, improving job quality, and addressing workforce inequities for underrepresented populations is not only an avenue for long-term economic development; improving job quality and reducing gender and racial inequities is also good for the tech industry's bottom line and the well-being of Washington workers and their families. Improving job quality and reducing inequities should become a focus of economic and workforce development policy state–wide, as well as regionally– particularly in King County with its high concentration of tech companies and workers.

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THE CONTEXT

In the not-so-distant past, the technology sector and its workforce were viewed as a peripheral sector of the economy. Today, the technology sector, with its unprecedented wealth and economic concentration, shapes our lives and our democracy in various ways. The COVID-19 pandemic with its lockdown life adjustments has brought the reality of a tech-centric economy into national relief. Need more Clorox wipes? Order them from Amazon. Instead of going out to eat, order takeout through a software application. For school and work, use Microsoft Teams to connect to co-workers, teachers, and classmates. These daily interactions conducted through software are made possible by the workers who code the applications, pack the boxes, and deliver the takeout.

A significant number of the companies and workers making this happen call Washington state their home. Our state is host to thousands of technology companies, with Amazon and Microsoft emerging as the two dominant players with a combined market capitalization of over $3 trillion. Many other major leaders in the tech sector, including Facebook and Google, have a significant presence and impact in the state.

In addition to large global tech corporations, a dense web of small and medium-sized businesses in Washington engage in activities including software publishing, web and mobile apps, cloud computing, and computer services. These core activities are interconnected with a range of temporary staffing providers, university and public sector research centers, educational institutions, and investment sources such as angel, venture capital, and private equity.

ABOUT THE REPORT

This report is for workers, policymakers, and key stakeholders and provides a new perspective and understanding of the tech workforce and its structural and institutional inequities. Far from being monolithic in structure, the sector encompasses a wide variation of wages, occupations, and job quality. In this paper we refer to this constellation of technology activities as the "tech ecosystem." Several previous studies have focused primarily on the size, breadth, and economic impacts of the sector. While such studies have highlighted wages, which on average are significantly higher than many other sectors and occupations, most do not examine the structural and institutional inequities within the tech sector.

This report offers an alternative narrative to the popular perception that all tech workers earn high wages in high quality jobs. The job quality, wages, benefits, and opportunities for career advancement of contract workers, gig workers, H-1B workers, low-wage workers, women, Black, Indigenous, and people of color (BIPOC) communities, immigrants, and refugees tell a different story and do not align with the popular view of tech workers.

In this report, we explain the various types of employment arrangements that exist in the tech sector and highlight the sector's reliance on gig and independent contract workers and address the skewed utilization of H-1B workers whose income is artificially depressed by antiquated federal guidelines and employer practices. We found that even in higher skilled, higher wage occupations such as software engineering H-1B visa workers are often underpaid relative to their U.S. citizen and green card occupational peers.

This report draws on multiple sources, both qualitative and quantitative. Analysis examines state and federal data sources and existing studies, such as the *2015 Washington Technology Industry Alliance* report[1] on the economic and fiscal impacts of the tech sector, with adjustments to reflect the narrower sector definition used in this report (excluding manufacturing and telecom). For this paper, we interviewed three male engineers (two at Amazon, one at Google), a male technical program manager at Google, two female staffing agency contractors currently working at Microsoft who have both worked in the industry for decades, and one widely published expert in the field, Margaret O'Mara, Howard & Frances Keller Endowed Professor of History at the University of Washington.[2]

JOB QUALITY AND WORKFORCE EQUITY

We believe that government at all levels has a crucial role to play in improving job quality and lowering gender and racial disparities in the tech workforce. With these goals in mind, the report concludes with a set of policy recommendations designed as a thoughtful resource to generate dialogue among key stakeholders, advocates, and policymakers.

JOB QUALITY

We define a quality job as one that includes the following basic elements:

Living Wages for a decent standard of living

Career-Building for workers to develop needed skills, networks, and experiences

Basic Benefits to increase economic security, improve health, and promote work-life balance among workers

Wealth-Building opportunities for long-term financial security

A Fair and Engaging Workplace that balances the priorities and well-being of employees with the needs of the business.

WORKFORCE EQUITY

In addition to the problems of job quality and economic instability, this paper addresses the reality that BIPOC, women, and certain groups of immigrant workers are under-represented and under-paid in a range of occupations in the tech sector relative to each group's share of the overall population.

Workforce inequity occurs when the number of BIPOC, immigrant, refugee, and women workers in tech occupations are under-represented in proportion to their number in the population, resulting in wage and career disparities.

Workforce equity also requires meaningful engagement between the business sector and under-represented communities, either directly or through intermediaries that value and uplift communities as equal partners in designing solutions to workforce inequity.

The root causes of these inequities are addressed later in the report.

THE TECH SECTOR
AND ITS WORKFORCE

DEFINING THE TECH SECTOR AND WORKFORCE

We define the technology sector as consisting of businesses and organizations primarily engaged in one of four main subsectors: business services, electronic retail, internet services, and software publishing (Exhibit 1). For example, our definition of the sector includes all workers directly employed by the big four tech companies in the Seattle area: Amazon (including warehouse workers), Microsoft, Google, and Facebook, as well as startup companies, but excludes other sectors such as manufacturing and telecommunications included in other studies of the tech sector.

The categories of workers examined in this study include but are not limited to, writers, editors, testers, designers, engineers, systems analysts, customer service, marketing, and product managers. We include workers employed in the tech sector, based on their employer, but exclude tech workers employed in non-tech sector businesses, such as software developers working at banks or in agriculture. We also included estimated self-employment, such as sole proprietors.

Exhibit 1. Industry Definition of Tech Sector and Subsectors in Washington State[3]

Subsector	NAICS codes	Examples
Business Services	541511 Custom computer programming services 541512 Computer systems design services 541513 Computer facilities management services 541519 Other computer related services 611420 Computer training 811211 Consumer electronics repair and maintenance 811212 Computer and office machine repair 811213 Communication equipment repair 561499 All other business support services	Cloud computing services (including Amazon Web Services).
Electronic Retail	45411 Electronic shopping and mail order houses	E-commerce portion of Amazon, other ecommerce platforms.
Internet Services	518210 Data processing, hosting and related services 519130 Internet publishing and web search portals	Cyber security firms; web ports; hosting services.
Software Publishers	511210 Software publishers	Microsoft

Source: Washington Technology Industry Association (2015); authors' revisions.

In 2019, we estimate there were 245,900 workers employed in the tech sector as defined in this report (Exhibit 2). By contrast, this represents three times the size of Washington state's aerospace sector. This estimate includes workers employed by tech companies and self-employed workers, such as

sole proprietors of tech start-ups. Included in the number 245,900 are tech workers employed by companies whose primary activity involves the production or support for software and internet-based solutions, as well as self-employed workers. This number does not include a count of workers who rely on technology solutions and platforms as core to their work, such as Uber and Lyft drivers.[4] Also, while some workers employed as contractors with staffing agencies are captured in our estimate, others may not be accounted for in our numbers due to industry classification of these businesses (e.g., "temporary hiring agencies").[5]

Exhibit 2. **Washington Tech Workforce Annual Employment, Statewide, 2013-2019 (est.)**
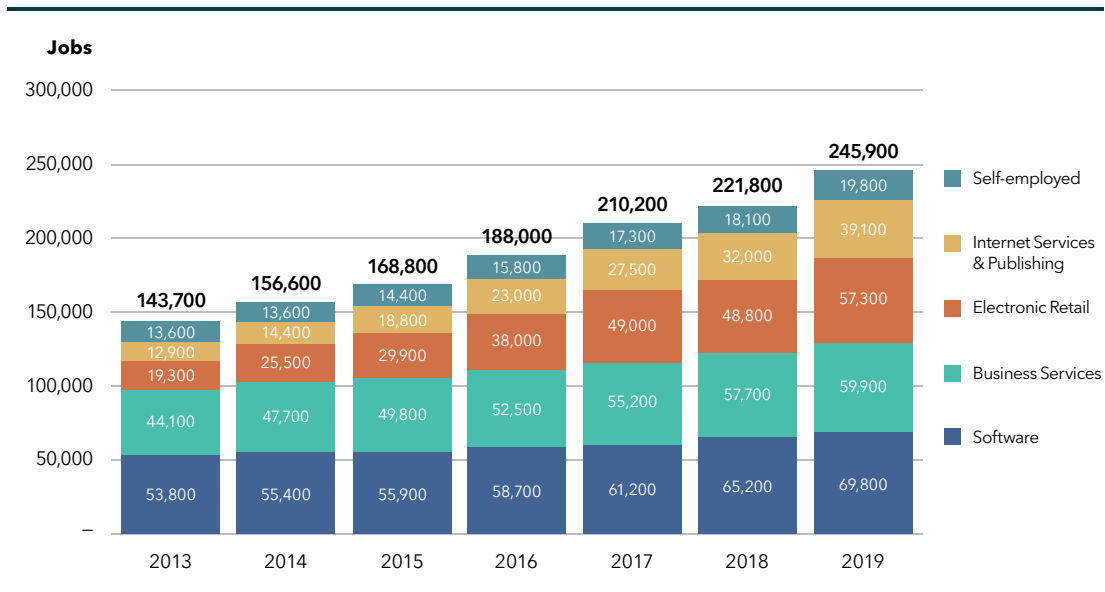
Data sources: U.S. Bureau of Labor Statistics (2021); Washington Technology Industry Association (2015); Washington State Employment Security Department (2020a).
Note: Definition based on WTIA 2015 report definition, but with exclusion of manufacturing and telecom activities.

Workers who are employed by a non-tech sector firm but contracted to work at a tech company are not captured in our sectoral-based definition. For example, cafeteria staff, janitorial staff, security, Amazon delivery drivers, and Microsoft shuttle drivers employed by non-tech firm contractors are not included in our study. These workers all technically work for other companies, their jobs are more peripheral to the mission or product of the tech companies they are contracted to, and their numbers in the workforce are difficult to determine. These are important groups of workers who allow the smooth running of the tech ecosystem, and more research is needed to understand their jobs throughout the full range of technology-related work.

Currently there is a trend towards relying on underpaid categories of workers, such as H-1B workers, staffing-agency contract workers, and gig workers; therefore, many demographic groups including women and BIPOC remain severely underrepresented in the high-paying jobs within the sector. We have concluded that the sector is too large and the companies too wealthy and powerful to self-correct. As a result, we make recommendations at the end of this report to ensure the sustainability of the sector, with well-paying jobs available to all in Washington state.

In terms of geographic distribution, King County hosts 83.9 percent of all tech workers in the state, the majority of whom are in the Seattle and Bellevue areas. However, there are smaller concentrations of tech employment across the state, such as in Clark County (traditionally an important hub for semiconductor work), Snohomish County, Whatcom County, and Spokane County. While our recommendations focus on the federal and state level, local Seattle and King County level policymakers must play a crucial role.

ECONOMIC IMPACTS GENERATED BY THE TECH SECTOR

The tech sector is among the fastest growing segments of the Washington state economy. Between 2013 and 2019, tech sector employment grew at a compound annual growth rate of more than 8 percent, or 71 percent overall; this compares with overall employment growth in Washington of less than 3 percent per year during the same period. Today, Amazon (80,000 employees) and Microsoft (58,000 employees) are the largest tech-sector employers in Washington, with more than 55 percent of the total workforce. Amazon is now the largest employer in the state, surpassing Boeing.

As a large and growing workforce, tech-sector employment generates a tremendous amount of economic activity and jobs in Washington. Tech-sector businesses make additional supply-chain purchases in the state, such as energy, computer equipment, and various other inputs necessary for operations. These purchases in turn support additional jobs, income, and revenues among the supplier businesses ("indirect impacts"). In addition, workers employed at tech firms and supplier businesses spend a share of their earned income on household goods and services, such as groceries, entertainment, restaurants, and retail purchases, further supporting the incomes and revenues of an array of businesses in the state and generating impacts in the larger state economy; what economists and economic development professionals term "induced impacts."

The total economic impact of an industry sector can be depicted as a job "multiplier." For example, in 2019, the estimated jobs multiplier in the tech sector in Washington state was 3.7, meaning that every one job in the tech sector was associated with a total of 3.7 jobs across the economy, such as in restaurants, retailers, and other businesses. By comparison, according to the Washington state Office of Financial Management,[6] the aerospace sector is associated with a jobs multiplier in Washington state of 2.4, while ship and boat building (including naval shipyard operations) and crop production (including apple orchards) have multipliers of 3.2 and 1.5, respectively.

While the tech sector is often identified with startups in the media, technology startups do not represent a large share of the overall tech workforce in our region. A 2020 report from the Information Technology Industry Council ranked Washington twelfth in the nation when it comes to its startup market, with 5,044 startups, and only 9.4 percent of tech workers in the state working at startups.[7] Diversifying the tech ecosystem in Washington with more small and medium-sized firms, including startups, is one strategy that could potentially benefit the sector as a whole, as well as women and BIPOC, if the startups were prioritized for public funding and private investment as tech entrepreneurs.

MISCONCEPTION AND REALITY:
WAGES AND JOB QUALITY IN THE TECH SECTOR

As demonstrated above, the tech industry is more significant and complicated than some studies and journalistic reports have shown. We challenge the popular misconception that all tech workers hold a highly paid, high-quality job. In their efforts to ensure the sustainability of the tech sector, workers, policymakers, stakeholders, and advocates will benefit from deeper knowledge of its workforce: Who works in which jobs? What are the wages for different jobs and different categories of workers? Who is being excluded from the highest paying jobs in the sector?

For decades, headlines in newspapers and reports have hailed the high pay and perks offered to tech workers, and in so doing, have helped generate the popular misconception that all tech workers are high-paid and privileged. Such misconceptions overlook the fact that there are many different types of tech workers, and software developers have long been at the top of the pay hierarchy. Currently, business media often report claims that tech workers are wealthy.[8] For example, a 2018 article in *The Wall Street Journal*, headlined, "At Google's Parent Alphabet, Median Pay Nears $200,000." As high as this was, the article further revealed median pay was 18 percent higher at Facebook—$240,000.[9]

According to data just released from Amazon, a typical warehouse worker earns $36,640 a year, while the average pay base for corporate or white-collar employees is $150,000 a year, including stock options.[10] Comparing the extreme wealth concentrated at the highest levels of the tech industry to the minimum-wage pay of Amazon warehouse workers, the low pay of gig workers, and the lower-than-average pay of many staffing agency contractors and H-1B workers, reveals wage and benefit inequities in the tech sector that are rarely discussed in the media.

Good quality jobs include a living wage, basic benefits, career-building opportunities, wealth-building opportunities, and a fair and engaging workplace.[11] All workers, including tech workers, need consistency and security in employment, income, and financial well-being over time. In addition, the industry must begin to address in a meaningful and systemic way the institutional inequities and unequal opportunities it provides to women, BIPOC, and immigrant workers as discussed below.[12]

VARIATION OF WAGES

It is challenging to generalize about tech workers' wages in Washington state because of the wide variations of wage rates across occupations. Even excluding lower-paying jobs such as warehouse workers, gig workers, H-1B workers, and contract workers, there is much variation among the top 11 leading tech-sector occupations, with average annual salaries ranging from $43,500 for customer service representatives to $167,900 for computer and information-systems managers (Exhibit 3).[13]

Exhibit 3. **Wages in Leading Tech Sector Occupations**

Occupation	Employment	Average Annual Wage	25th percentile	50th percentile	75th percentile
Software Developers	74,110	$134,700	$108,000	$138,400	$158,200
Web Developers	13,780	$137,200	$101,400	$145,600	$182,500
Computer Occupations, All Other	11,800	$95,900	$68,200	$92,100	$122,400
Marketing Managers	11,540	$167,000	$116,200	$157,400	$200,800
Market Research Analysts and Marketing Specialists	9,010	$89,900	$54,300	$78,900	$126,400
Computer User Support Specialists	8,640	$63,900	$47,200	$58,800	$71,900
Computer and Information Systems Managers	8,560	$167,900	$128,200	$156,400	$195,400
Computer Systems Analysts	6,950	$103,600	$79,800	$99,700	$126,400
Customer Service Representatives	6,510	$43,500	$33,400	$39,900	$50,300
Business Operations Specialists, All Other	6,170	$85,000	$58,400	$77,800	$105,500
General and Operations Managers	5,140	$130,000	$79,200	$109,100	$160,500

Data sources: U.S. Bureau of Labor Statistics (2021); Washington Technology Industry Association (2015); Washington State Employment Security Department (2020a; 2020b).

TECH WORKERS:
TRENDS, CHALLENGES, AND NEEDS

FISSURING IN THE TECH WORKFORCE

The technology workforce in many ways mirrors broader economic trends in the U.S., with its growing reliance on low wage workers, staffing-agency contractors, and gig workers. David Weil's 2014 book *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve It* details this trend by analyzing how our economy and policies deny millions of American workers decent pay, benefits, and opportunities for career advancement as more employers are moving away from a traditional employment model towards outsourcing and subcontracting.[14]

The tech sector workforce is increasingly "fissured" with respect to wages and employment opportunities. Tech businesses significantly utilize staffing agencies and H-1B workers, many of whom are underpaid relative to their U.S. citizen and green-card holding occupational peers doing similar work. An engineer at Amazon revealed to us that their white-collar tech colleagues worry about how long the high pay and benefits they are accorded will last, reflecting a broader concern among higher paid tech workers about their own future as they witness various categories of workers being treated poorly.

Because tech companies do not make public the number of H-1B workers they hire for specific locations, like Washington State, or the number of contract workers they hire, it is difficult to prove that such fissuring is taking place within the tech industry. This challenge demonstrates a problem with the availability of data within the industry, which we address in our recommendations below.

RACIAL AND GENDER INEQUITY:
IN THE TECH WORKFORCE

While the big four tech companies in the Seattle area—Microsoft, Amazon, Facebook, and Google—have publicly committed to doing better when it comes to hiring and promoting more women and people of color, racial and gender disparities persist.

▶ **Factors Contributing to the Reproduction of Tech Workforce Inequities**

Gender and racial inequities in the tech workforce are rooted in a range of historical, economic, and political causes. These inequities are perpetuated by ongoing sexism and racism in society and have created institutional and generational barriers to equal employment opportunities.

Today, workforce inequities in the technology sector are a function of multiple factors and reflect larger workforce and labor market inequities. Factors that directly contribute to the reproduction of workforce inequities include, but are not limited to, the following:

- Toxic workplace culture, including sexual harassment, performance review bias, pay inequities, and lack of opportunities for career advancement, leading to high turnover for women and BIPOC.

- Under representation in computer science and other tech-related four-year degree programs creating low participation in the tech labor market (Labor supply).

- Hiring and recruitment practices among tech firms that do not address barriers to entry.

- Work environments not conducive to a diverse range of backgrounds and experiences.

- Underinvestment in K-12 tech education and post-secondary career pathways in low-income and underrepresented communities and school districts.

THE BIG-FOUR: GOOGLE, FACEBOOK, MICROSOFT, AND AMAZON

At Google,[15] Facebook,[16] Microsoft,[17] and Amazon,[18] male White and Asian workers comprise a large share of the workforce including technical and leadership roles. All other categories are severely underrepresented. Currently only Google releases any intersectional data,[19] an issue that needs to be addressed by policymakers, as outlined in our recommendations later in the report. For example, the category "Asian" is based upon the race and ethnicity categories used by companies to report employment data to the U.S. Equal Employment Opportunity Commission, which we find problematic. The category lumps together peoples from more than 25 countries in East Asia, South Asia, and Southeast Asia. We have provided a breakdown of different categories of Asian workers in the appendices to provide more detail on various groups of Asian tech workers.

Exhibit 4. Demographic Employment Shares in Leading Tech Companies

Company	Percent of overall employees	Percent of tech employees	Percent of leadership roles
Amazon*			
Women	44.6%	NA+	29.3%
Black	26.5%		10.6%
Hispanic/Latinx	22.8%		9.5%
Native American, Alaska Natives, Native Hawaiians & other Pacific Islanders	1.5%		0.7%
Facebook**			
Women	37.0%	24.1%	34.2%
Black	3.9%	1.7%	3.4%
Hispanic/Latinx	6.3%	4.3%	4.3%
Native American, Alaska Natives, Native Hawaiians & other Pacific Islanders	0.4%	0.2%	0.3%
Google			
Women	32.0%	23.6%	26.7%
Black	3.7%	2.4%	2.6%
Hispanic/Latinx	5.9%	4.8%	3.7%
Native American, Alaska Natives, Native Hawaiians & other Pacific Islanders	0.8%	0.7%	0.5%
Microsoft*			
Women	28.6%	22.8%	26.3%
Black	4.9%	3.6%	2.9%
Hispanic/Latinx	6.6%	5.3%	5.4%
Native American, Alaska Natives, Native Hawaiians & other Pacific Islanders	0.7%	0.5%	0.4%

Sources: Amazon (2020); Facebook (2020); Parker (2020); McIntyre (2020).
^Percentages for women are global and percentages for underrepresented minorities are for the U.S.
+Amazon does not provide a gender breakdown of tech employees
*Denotes women as percent of managers (at Amazon & Microsoft)
**Denotes women as percent of director-level and above (Facebook)

At these same companies, women, while comprising between 28 and 45 percent of overall workers, are underrepresented in technical roles (Exhibit 4). Currently, only 24 percent of technical workers in the U.S. are women.[20] This finding is supported by data from the big four, where women make up only 22 to 24 percent of technical workers at Microsoft, Google, and Facebook.[21] Women are faring better when it comes to leadership, making up 26 to 35 percent of leadership roles at the big four. Even since Microsoft, Facebook, and Google have been releasing such data, the number of women in technical roles has been rising very slowly, by a percentage point or less per year, demonstrating a lack of commitment to or sense of urgency for substantive change.

While the tech industry has long acknowledged a labor market and workforce development "pipeline problem," and "skills shortages," it has done little to address these workforce equity issues. Far less attention has been paid to what happens to women and underrepresented BIPOC workers who make it into the tech sector (the inclusion part of Diversity and Inclusion). Many women and BIPOC workers leave their jobs by mid-career due to the toxic work culture and "boys' club" atmosphere within the tech industry, marked by microaggressions, sexual harassment, and a lack of support for parents or work/life balance.[22] Many women in tech "feel their voices are not heard, their ideas are not valued, and their skills and expertise deemed invalid."[23]

Women are paid less than men within the tech sector for work in comparable jobs. The U.S. Department of Labor is suing Google over "systemic compensation disparities against women" while Microsoft and Google are currently being sued by present and former employees regarding issues of pay and promotions.[24] Occupational segregation within the tech sector helps contribute to the gender pay gap, with women being steered into different, lower-prestige, lower-paid job categories than men, even within engineering.[25] Research has indicated a strong bias in performance reviews, as referenced below by a staffing agency contractor who gave up a full-time tech job partly due to not wanting to go through the performance review experience on a regular basis.

Research further indicates that men and women are scored differently in performance reviews for the same behavior, with women being admonished for being too aggressive (in an industry that generally rewards initiative and aggressive behavior – among male employees). In fact, 88 percent of women's performance reviews contain critical feedback, versus only 59 percent of men's reviews.[26] In response to sexual harassment complaints by women not being taken seriously by the company, in 2018 Google workers staged a world-wide walkout, the largest such demonstration in the history of the tech sector.

A recent article demonstrated the scale of racial discrimination at Amazon, where interviews and internal data revealed that Black Amazon employees are promoted less frequently and are rated more harshly than their non-Black peers.[27] A Black female global manager of diversity in Amazon's cloud computing division quit her job after less than a year, stating "Amazon appeared to be taking steps backward instead of forward."[28] In addition, in March, 2021, a Black woman senior manager at Amazon filed a federal suit, alleging she was paid less than similarly qualified white peers and that executives used racial stereotypes to deny her promotion opportunities.[29] She also reported allegations of sexual harassment and assault against a former Amazon director, demonstrating the intersectional oppression faced by women of color in the tech industry.

On April 14, 2021, Amazon publicly released the most detailed demographic data for its employees and announced ambitious workforce diversity goals for the next year, planning to increase the representation of Black employees and women among its corporate workforces. Amazon's plan is to double the number of Black executives, hire 30 percent more women for senior technology roles, and hire 30 percent more Black product managers, engineers, designers, and other corporate roles. Currently, women, Black, and Latino employees are underrepresented in the best-paid jobs at Amazon, and overrepresented in the lower-paid jobs, including warehouse and call center workers.[30]

The data above demonstrates how gender and race disparities in tech-sector workplaces and occupations persist. Those with the most opportunities, when it comes to technical roles and leadership, remain men. Women of all races remain sidelined from the most prestigious and well-paying jobs in tech; within engineering, they tend to be steered into lower-prestige tracks, and are often encouraged to become Program Managers as they advance instead of advancing into senior technical roles.[31]

Expanding employment opportunities and addressing workforce inequities for underrepresented populations is not only an avenue for economic development, it is also good for the tech industry's bottom line. Multiple studies show corporate diversity improves management and decision-making, improving profit margins, innovation, and productivity.[32]

IMMIGRANTS, REFUGEES AND GUEST WORKERS
IN THE TECH WORKFORCE

> **The tech workforce is comprised of both native-born and foreign-born workers. The term "foreign-born" includes immigrants, refugees, and temporary guest workers.**
>
> **Immigrants** are those who live in the U.S but were born in another country. Immigrants generally come to the U.S. for several reasons but primarily to join family members who already live in this country, or they are "economic immigrants" seeking work and a better life for themselves and their families – or both.
>
> **Refugees** are those forced to leave their home countries because of war, environmental disasters, political persecution and/or religious or ethnic intolerance. They come to the United States with a special immigration status that gives them automatic admission into the country and helps them connect with family members who are already in the country. This status also provides them with the opportunity to apply for a "green card" or a permit to work. Refugees are "invited" to live in the United States to start a new life.
>
> **Guest Workers** are those foreign-born workers who are hired by U.S. employers under the foreign labor certification program. Guest worker visas such as H-1B allow foreign-born non-immigrant workers to live and work in the U.S. for or a fixed period of time, and their work permit is tied to their employer. Guest workers can also apply for Legal Permanent Residency (LPR) through their employers.

Foreign-born workers (immigrants, refugees, and guest workers) are employed across a range of occupations in the tech sector and have varied pathways to US citizenship. According to workforce data and diversity reports white male and foreign-born Asian workers (primarily Chinese and Indian) together represent the majority of workers in the tech industry, as well as those in leadership roles, and Asian workers represent the biggest category of workers in technical roles. In 2019, an estimated 63 percent of all workers in the tech sector, across all occupations, identified as "white alone," followed by "Asian Indian Alone" and Chinese (excluding Taiwanese). Chinese and Indian tech workers have much higher shares of tech sector employment relative to each group's share of the overall statewide population (2 percent each) (Exhibit 5).

The role and number of H-1B workers as well as the percentage of Chinese and Indian Asian subgroups in higher-paying positions in the tech sector often obscures the role and number of under-served immigrant and refugee populations living in Washington state in the technology sector as most immigrant and refugee community members, including those with foreign technology credentials, struggle to find their way into the technology sector. (See Appendix A for a detailed breakdown of foreign-born workers in Washington by ethnicity in Computer and Software occupations economy-wide.)

Exhibit 5. **Employment Shares in the Tech Industry by Ethnicity, 2019, Washington State**

Ethnicity	Industry Share	Population Share
White alone	63%	75%
Asian Indian alone	14%	2%
Chinese, except Taiwanese, alone	8%	2%
Two or More Races	4%	6%
Black or African American alone	2%	4%
Korean alone	2%	1%
Some Other Race alone	1%	5%
All others	*5%*	*6%*
Total	100%	100%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates – Public Use Microdata Sample 2019 (2020).

OCCUPATIONAL PROFILE OF FOREIGN-BORN TECH WORKERS (IMMIGRANTS, REFUGEES, AND GUEST WORKERS)

In 2019, according to the *U.S. Census Public Use Microdata Sample* (PUMS) data series, an estimated 51.1 percent of all software developers in Washington state were foreign born. This share includes naturalized U.S. citizens, immigrants, refugees, and H-1B workers. Foreign-born workers represented an estimated 35.5 percent of all workers in Washington state employed in computer and software occupations. (See Appendix C and Appendix D for more information.)

FOREIGN-BORN GUEST WORKERS IN THE TECH WORKFORCE

The tech sector's reliance on foreign-born temporary guest workers for technical positions is very much tied to the sustainability of the sector moving forward. While the H-1B program was designed for U.S companies to be able to hire the best and the brightest from other countries to fill labor shortages, segments of the tech industry have come to use the system largely to hire entry-level positions from abroad without advertising or recruiting for such positions from within the U.S. labor pool.

O'Mara points to the vital role of immigrants, refugees, and their children in the tech industry, from Andy Grove, a pioneer in the semiconductor industry, to Sergey Brin, co-founder of Google, American immigration policy remains deeply connected to the tech industry. Washington state is home to 1.1 million immigrants, comprising 15 percent of the population and 20 percent of the workforce.[33] Many foreign-born workers work in various occupations in the tech industry.

One of the most common employment arrangements for foreign-born workers is to contract them through the H-1B guest worker program, created in 1990 to fill gaps within the U.S. labor market. Nearly 70 percent of H-1B workers are hired in computer-related occupations by tech companies and various outsourcing firms who supply contractors to the tech industry.[34] The workers are tied to their specific employer and must leave the country if they lose their job, giving employers a great deal of control over their pay, hours of work, and working conditions.

Washington's leading technology companies actively recruit H-1B workers to fill its ranks of employees. In fiscal year 2019, Washington companies filed more than 48,000 H-1B applications, of which nearly 50 percent (23,935) were for new employees (the remainder for continued employment, change from previous employment, new concurrent employment, change of employer, or amendments). Of these, approximately 36,000 H-1B applications came from tech companies (as defined above), including for new workers and renewals (Appendix E).

Tech companies and staffing agencies constituted the largest share of certified applications, with Microsoft and Amazon alone representing 56% of all such applications. There is no readily available data source on the number of actual H-1B workers in the tech sector by state—this data is only available nationally by employer. However, on average, roughly one third of new applications each year are successfully approved. Based on this, and assuming all renewals are accepted, we can estimate that more than 20,000 H-1B workers were admitted or renewed in Washington state in federal fiscal year 2019.

According to O'Mara, while the H-1B program is fraught with problems, it has been "an important avenue for the diversification and internationalization of the American tech workforce." However, the program's flawed design has led to the exploitation of foreign-born workers, who are dependent on a specific employer and who are often paid less than American workers doing the same job.[35] A 2020 report by Costa and Hira revealed that nearly all employers, including in the tech industry, use the program to pay foreign-born workers "well below market wages."[36] This also appears to be the case in Washington where H-1B workers are making less than the "prevailing" wage for their occupations, with computer systems analysis showing the largest disparity making 38.3 percent below the estimated average wage for the job (Exhibit 6).

Exhibit 6. H-1B certified Visa Applications by Occupation and Reported
Prevailing Wage and Median Wage Economywide by Occupation, 2019

Occupation	Prevailing Wage	OES Median Wage, 2019	Difference
Software Developers, Applications	$109,400	$138,400	-21.0%
Computer Occupations, All Other	$79,800	$92,100	-13.4%
Software Developers, Systems Software	$110,800	$99,700	11.1%
Computer Systems Analysts	$85,400	$138,400	-38.3%
Computer and Information Systems Managers	$139,200	$156,400	-11.0%
Computer and Information Research Scientists	$121,500	$145,200	-16.3%
Operations Research Analysts	$82,000	$95,400	-14.0%
Statisticians	$85,000	$103,000	-17.5%
Computer Programmers	$102,300	$135,300	-24.4%
Network and Computer Systems Administrators	$76,100	$92,700	-17.9%
Management Analysts	$104,200	$97,100	7.3%
Marketing Managers	$126,100	$135,300	-6.8%
Database Administrators	$90,600	$115,700	-21.7%
Information Security Analysts	$97,000	$115,700	-16.2%
Mechanical Engineers	$73,400	$94,800	-22.6%
Transportation, Storage, and Distribution Managers	$104,500	$111,400	-6.2%

Sources: U.S. Department of Labor Employment and Training Administration,
Office of Foreign Labor Certification (2021); U.S. Bureau of Labor Statistics (2020).

Exhibit 6 Notes:

Prevailing Wage: The U.S. Department of Labor regulations require that the wages attested to on foreign labor certification applications must be the median wage paid to all other workers in the requested occupation in the area of intended employment. Based on federal data, among H-1B certified applications across all occupations and industries in Washington state, approximately 7 percent were for positions with compensation below the median prevailing wage. Among tech staffing agencies, this share was 74 percent.

OES Median Wage: OES stands for "Occupational Employment Statistics." OES is a data series released each year by the U.S. Bureau of Labor Statistics and Washington State Employment Security Department. Data are wages, excluding benefits, year-end bonuses, and several other income supplements, reported by occupational category. The data is not industry-specific, but economy-wide for each state and certain substate regions.

Hira and Gopalaswamy [37] argue the H-1B program should be used for its original intent, to hire the "best and brightest" high-salary workers where no U.S. worker is available, or in fields with labor shortages. More research is needed to determine the number and percentage of H-1B visa holders who become legal permanent residents in Washington state to determine the effectiveness of the H-1B as a pathway to legal permanent residency and citizenship. Persistent concerns over the role of outsourcing firms have also dogged the H-1B visa program. Greater data on how such firms conduct their business, and how their workers are paid, access potential pathways to citizenship and are treated in the workforce would provide needed transparency to the H-1B visa program.

In an interview, a technical program manager who initially worked for Google on an H-1B visa but has since become a permanent resident felt that overall the company had a "good program for supporting immigrants." Google managed the transfer of their H-1B visa from a previous employer, and also the green-card application process. However, they noted the "fear and worries" that come with such a contingent status. They also felt the H-1B visa program is not used as intended for filling labor shortages in the U.S. market, and "the program is being abused for cheap labor."

CONTRACT AND GIG WORKERS
IN THE TECH WORKFORCE

CONTRACT WORKERS

▶ While contract work is not new, the intensified fissuring of the American economy in general, and of the tech sector specifically, has led to an increased reliance on contract workers from staffing agencies and as independent contractors. The sustainability of the tech sector is linked to contract workers in a very specific way. Increasingly, full-time employees work alongside contract workers on a daily basis, which has led many full-time employees to wonder about the future of their jobs, and the future of the sector as a whole. Those who are in full-time permanent positions are aware of the increased use of contract labor and it raises concerns for them about the future of work within the sector and how far into the future the well-paying full-time tech jobs with benefits will last.

Both of the staffing agency contractors we interviewed spoke about the benefits of being a contractor in terms of flexibility, the ability to work from home, and increased freedom. At the same time, they pointed out the disadvantages of being a contractor, which include: a lack of job security and benefits; high insurance rates; variable compensation depending on the contract; and the uncertainty of how much work one will have week to week. Other significant disadvantages of contract work include: lack of access to company resources needed to do one's job (due to security constraints); navigating benefits, workloads, skill building, and training on one's own; and less opportunities to collaborate and socialize with co-workers or to discuss the challenges faced in one's job.

One of the outcomes of the COVID-19 pandemic is the increased flexibility and the ability of tech workers to work from home. We suggest that those engaged in tech-sector workforce issues track how this trend unfolds as tech companies plan for the future of returning to the office, hybrid work, or continuing to work from home, and how this might impact staffing agency contractors.

Contract workers working at tech companies in white-collar jobs are generally hired through staffing agencies and not counted in the official tally of tech-sector employees. They are paid less, accorded fewer benefits and perks, and have less job security than direct employees, even though they often work side-by-side doing similar jobs. One of the main issues with contract work is whether contract workers are being hired for the correct legal purpose - for a specific short-term project/contract, or whether they are doing the long-term job of a direct employee but not being compensated or treated as such. Such labor practices are referred to as "perma-temping."

We interviewed a software engineer at Google who reported their pay fit the average cited above, explaining that these salaries may seem high today because the average pay of most U.S. workers has stagnated. Also, salaries in the tech workforce are rarely compared to executive compensation which far exceeded average worker pay inside of Google. A veteran freelance technical writer, who was working on contract with Microsoft when we spoke, reported she made $45 an hour. While working for two different staffing agencies, supporting Amazon Web Services events, she earned $32,000 before taxes, had to provide her own equipment and purchase her own healthcare. In such cases, compensation is lower when compared to direct hires because contract workers do not receive the same level of benefits as do direct employees at companies like Microsoft or Google. This data demonstrates the need for training opportunities for contingent workers within the industry to be able to move into better paying career tracks.

In 2014, Microsoft employed an estimated 71,000 staffing-agency contractors versus 100,000 full-time direct employees worldwide.[38] That same year, Microsoft implemented a new policy requiring contractors, or "external staff" to take a six-month break after every 18 months on the job.[39] The intention of this practice was to ensure that contractors are hired just on a short-term basis for specific projects, and thus could not be characterized as de facto full-time employees. Currently some teams at Microsoft are still hiring large numbers of contractors, rather than direct employees, to avoid restrictions on internal headcount.[40]

Because none of the big tech companies besides Google publicly release figures on how many staffing-agency contractors they employ, it is not currently possible to determine the actual numbers for the industry as a whole. While a significant number of contractors are known to work at Microsoft and Facebook, more than half of Google's global workforce consists of temporary, vendor or contractors (TVCs). As of 2020, Google employed more than 130,000 TVCs versus 123,000 full-time employees.[41] TVCs at Google include lower paid categories of workers such as cafeteria employees and security guards, but also all types of white-collar workers, from programmers to graphic designers. Contractors do not have the stability of a full-time job, nor the pay, benefits, or stock options that come with such a position, nor the perks offered to full-time employees at Google, such as free meals. In addition, contractors at all tech companies have fewer options in dealing with harassment or bullying, as the likely outcome of reporting such behavior to one's staffing agency is to be moved to another contract rather than any sort of resolution of the problem. To better address this issue within the sector as a whole, we recommend that all tech companies must make public the number of contractors they hire and for what types of positions.

Interestingly, it appears that Amazon relies far less on staffing agency contractors than does Google, Microsoft, and Facebook. Of the Amazon employees that we interviewed for this project and other projects in the past, most reported having not worked with contractors and do not know any contractors at Amazon. One contractor we interviewed worked on a four-month contract at Amazon a few years ago, indicating that Amazon does use contractors, but it appears that the company does not rely on them to the extent that the other big tech companies do. As their labor practices indicate, other tech companies consider contractors to be an important part of their workforce, necessary to their operations, but Amazon appears to show that this is not necessarily the case or the only model available.

One female staffing agency contractor at Microsoft mentioned not being subjected to regular performance reviews as one reason for leaving a full-time job in the tech industry, while the other mentioned work-life

balance early in her career. Both women have worked in the industry for decades but left full-time positions to become contractors, at least in part due to equity concerns. As mentioned above, one contractor told us she currently makes $45 an hour after three decades in the industry, and that wages for her specialty range from about $27-$55 an hour. This translates into annual wages ranging from $56,000 to $114,000 based on full-time hours, which are not guaranteed to contractors.

While tech companies have come to rely on contractors for everything from drivers, cafeteria staff, janitors, and security guards, they have also expanded their reliance on contractors for white-collar professional technical jobs, from writers to engineers, hired through staffing agencies. In addition, in recent years the tech labor market has been impacted by a reliance on "gig workers." The creation of tech apps to provide piecemeal jobs or "gigs," such as those carried out by Uber and Lyft drivers, is a trend within the economy that sees workers classified not as employees, but as self-employed independent contractors, who are not entitled to the minimum wage, or to healthcare, retirement, or unemployment insurance benefits.

GIG WORKERS

Gig workers are generally classified as independent contractors, not employees, and are paid per job or "gig" and largely do not qualify for minimum wage or benefits such as healthcare, retirement, or unemployment insurance. Often their pay is so low that they fall below the federal poverty line and qualify for supplemental nutritional assistance and Medicaid. The rise of the gig economy in recent years is another example of the fissuring of the workplace, with some workers categorized as employees who are entitled to a certain level of pay and benefits, while others are not, including independent contractor gig workers.

While many gig workers enjoy the flexibility their jobs entail, there are many disadvantages to gig work, including low pay, lack of benefits, lack of career advancement opportunities, as well as issues with how the apps themselves are run and how jobs are acquired. Uber and Lyft drivers in the Seattle area are 89 percent male, 50 percent Black, 72 percent foreign-born, and 70 percent have less than a four-year college degree.[42] Given this demographic data, larger concerns emerge about the lack of job opportunities within the traditional labor force for Black men and immigrant men without a four-year college degree.

Solely enabled by the development of internet-based distributed platforms, the gig economy of alternative work arrangements has grown dramatically in recent years, with 36 percent of all U.S. workers having some form of gig work arrangement.[43] While most gig workers work outside of the tech sector, those who work for "on-demand" platforms such as Uber and Lyft are carrying out the jobs created by tech companies within the broader tech ecosystem. The increased reliance of the tech sector on contract workers of all kinds requires further research.

WORKER ORGANIZING

The tech sector is unique for its lack of an organized labor presence compared to other sectors in Washington's economy such as aerospace, healthcare and transportation. O'Mara notes that the tech sector started growing in the 1980s when President Reagan's era of deregulation took hold, overall unionization rates started "slumping," and a "post-1988 America" status quo in the industry emerged of "no unions" to represent workers. However, this is starting to change as warehouse and gig workers are organizing for worker rights and benefits such as better pay and access to unemployment insurance, as well as for health and safety issues.

Recently 6,000 warehouse workers at an Amazon fulfillment center in Bessemer, Alabama attempted to unionize with the Retail, Wholesale and Department Store Union, a part of the United Food and Commercial Workers International Union (UFCW). The effort failed by a near two-to-one margin, but it brought international attention on the high-turnover of employees and demanding work conditions inside Amazon warehouses. The union argued the campaign was also about the future of work in the U.S. Amazon ran a well-financed anti-union campaign, which demonstrated the lopsided way in which U.S. labor law favors employers' ability to avoid unionization versus the true sentiment of workers' ability to vote for a union.

White-collar tech workers are also starting to organize. Google workers have recently formed the Alphabet Workers Union (AWU), a minority union of about 800 full-time direct employees, as well as staffing agency contractors and other blue-collar contingent workers, alongside the Communications Workers of America. The AWU is active in Silicon Valley as well as in Washington state.

Other tech-worker organizing taking place in Washington includes efforts by Working Washington, a community organization affiliated with Service Employees International Union (SEIU), engaged in advocating for gig and platform restaurant delivery workers, as well as other unions interested in organizing Uber and Lyft drivers. There is also DiscoTech, a group of tech workers from various companies who are committed to ending workplace discrimination, Amazon Employees for Climate Justice, which has staged walkouts and put forward shareholder resolutions calling upon the company to reduce its carbon footprint, and the Tech Workers Coalition, who are building labor solidarity between full-time and contract workers.

According to O'Mara, current "cross-class solidarity" worker organizing between white-collar and more precarious blue-collar workers, as expressed within AWU, is "unusual in the American labor movement" and comes at a time when worker organizing has been able to put public pressure on tech companies to achieve gains. She argues that since the tech industry is so competitive, and its image is based around ideas of being innovative and changing the world for the better,[44] there is an avenue for workers to publicly shame tech companies into changing their policies and behaviors.

RECOMMENDATIONS:
QUALITY JOBS FOR ALL IN WASHINGTON'S TECH SECTOR

The sustainability of the technology sector has become increasingly important as the sector has emerged as both a dominant economic force and a core employer in Washington state. O'Mara has noted that the industry, and companies like Amazon and Microsoft, have become monopolistic, on par with Standard Oil and U.S. Steel in the past. Therefore, ensuring a sustainable future for tech industry workers requires government at all levels to intervene in the labor market and oversee the sector. The following are recommendations at both the federal and state level that we believe should be initiated to support efforts to produce sustainable jobs that are equitable, stable, and provide living wages, generating wealth for workers and the larger community.

In Washington state, the Office of the Governor, the Department of Commerce, the state workforce board, and other agencies are key components of our larger workforce ecosystem and provide valuable services. But we must better align and coordinate economic development and workforce development strategies and investments between the Governor's office and across Washington's economic and workforce development agencies to better address current disparities and labor market failures in the tech sector and workforce.

FEDERAL LEVEL

- **Institute a H-1B visa performance review taskforce:** The Department of Homeland Security, Department of Labor, and the Department of Justice should form a taskforce comprised of immigrant-rights activists, unions, and technology companies to review the data and come up with recommendations to ensure pay equity and pathways for permanent residency status for H-1B workers from all countries.

- **Create an equity-in-tech working group within the Office of Science and Technology Policy (OSTP)** that would coordinate with other agencies like the Department of Labor, the Equal Employment Opportunity Commission, and with members from the technology industry, workers' rights groups, BIPOC organizations, and women's rights groups to identify policy recommendations to address workplace equity issues in the sector.

STATE LEVEL

- **Broaden the Governor's Information and Communication Technology (ICT) sector lead's scope** to include promoting equity, stability, and quality jobs throughout the industry. Building a robust technology sector in Washington requires going beyond business recruitment. This work would be further supported and coordinated if an ICT lead role, focused on tech-worker training, was created at the Workforce Training and Coordinating Education board.

- **Create a Washington Innovation start-up fund:** California, Illinois, Oregon, and Vancouver, BC have created funds utilizing public investment dollars to support expanding their state's technology start-up sector. Washington should create a similar fund, modeled after these efforts, to incubate the next generation of entrepreneurs for technology products and jobs. The fund should particularly target and support women and BIPOC business leaders for funding.

- **Expand the Center of Excellence for Information and Computing Technology:** Washington has created 11 centers of excellence to support economic development and education across the entire state. Working with the state's institutions of higher education, community and technical colleges around the state should broaden the ICT focus to include continuous training and upskilling of the technology workforce (incumbent workers) in areas beyond computer science and robotics, for other career pathways the sector offers, such as project management and technical writing. In addition, the centers should fund the development of career pathways for workers working in the sector but not employed directly by tech companies, such as contract and immigrant workers, to access training for jobs. The centers should also include an equity component for women and BIPOC workers who need potential wrap around services to support additional education and training.

- **Launch state-supported worker-owned co-ops** that independent and contract workers could join to provide services to the technology sector that could offer the workers a more stable and equitable employment relationship with the industry employers. The services for inclusion involve incumbent-worker training, job placement, and portable benefits schemes potentially modeled after ones in countries like Denmark, Norway, and Sweden. The organization could also be focused on how to recruit, retrain, and retain women and BIPOC workers.

- **Convene a BIPOC tech summit,** along with regional workforce development councils, to identify structural barriers and solutions led by and centered on people of color.

- **Institute an annual state-of-technology and tech workforce report** that would produce detailed information on the number of workers in the state, including independent contractors, staffing agency contractors, and H-1B workers, and address the state of diversity within the tech industry. Combine the data from all of the diversity reports released by the big tech companies, as well as requiring such data from smaller firms. Currently, there are limited sources of information on these issues; the need should be addressed more intensively. A comprehensive annual report could establish a data-rich baseline to guide more effective policy development for the technology sector.

- **Invest in institutions charged with identifying and supporting immigrants and refugees with foreign credentials** to apply those credentials to the workforce in Washington state. The Welcome Back Center at Highline College in south King County is one such agency, though they have lacked resources to focus attention on technology workers.

- **Create state and regional liaison positions to build and strengthen networking opportunities** between technology companies and social service organizations working with immigrants and refugees with technology credentials. Such efforts could establish private-public strategies to provide apprenticeship, up-skilling, and tailored technical language learning opportunities to assist immigrants and refugees with technology skills to re-enter the technology workforce in Washington state.

- **Invest in strategies to connect low-income community members (youth and adults) to skills of value** to the technology sector, including programming boot camps, and ensure that such programs include robust strategies for language access and cultural orientation. Skillspire is one such community-based organization working to connect immigrant and refugee community members to high-demand skills in the technology sector.

NEW QUESTIONS AND TOPICS FOR FURTHER RESEARCH

In the course of researching the tech sector, we identified questions that require future research that would benefit policymakers:

- Recent attempts to unionize within the tech industry, such as at Google, as well as through some delivery apps, such as at Instacart, requires further research into the balance of worker power within the industry.

- How artificial intelligence (AI) will affect jobs within the tech industry in the future, creating new jobs around AI and robotics, while eliminating some jobs that can be done by AI or robots (both full-time jobs and platform jobs).

- The gig economy requires further research, as it challenges many traditional notions about employment, particularly regarding job quality and access to benefits. There also appears to be a great deal of occupational segregation within the gig economy, with those working through apps such as care.com being largely women and women of color, while the vast majority of Uber and Lyft drivers in the Seattle area are men of color.

- The lack of intersectional data available from the tech companies themselves makes it difficult to track hiring, pay, and advancement by race and gender simultaneously. Currently, of the big four tech companies, only Google provides any intersectional data in its annual diversity report. More research is required in this area to understand how men and women of color, particularly those from underrepresented racial minorities, are faring in various job categories in the tech sector.

- More research is needed to determine the number and percentage of H-1B visa holders who become legal permanent residents in Washington state to determine the effectiveness of the H-1B as a pathway to legal permanent residency and citizenship. Persistent concerns over the role of outsourcing firms have also dogged the H-1B visa program. Greater data on how such firms conduct their business, and how their workers are paid, access potential pathways to citizenship and are treated in the workforce would provide needed transparency to the H-1B visa program.

CONCLUSIONS

In Washington state, the technology sector and its workforce has grown over the past two decades. It is now a leading driver in the state economy and represents trillions of dollars of market capitalization. While many tech workers are well-paid, this is not true for all tech workers. The Tech sector and public policies produce unequal wealth distribution, with many categories of workers paid less than the value of their labor, such as H-1B workers and contract workers. There is also a divide between different tiers of workers at all occupational and skill levels when it comes to pay and benefits, and career pathways which remain limited for women, BIPOC, and immigrant and refugee workers.

Washington's tech sector employs more than a quarter of a million workers, many of whom are paid middle-class wages that support families and a career over the long run. Tech workers have invested their time, resources, and talents to enter and work in the sector. This workforce, overall, is highly trained and educated, with the majority holding post-secondary degrees. As a matter of public policy, it is important for policymakers to play an active role in nurturing the continued development of a stable workforce and focus policies and investments on the sustainability of the tech sector in Washington.

The technology sector subcontracts out a substantial portion of its workforce to H-1B workers and staffing agency contractors who do not enjoy the same pay, benefits, security, and opportunity as "regular employees." Regular workers in the sector are noting this disparity, and fear that these developments could potentially undermine more secure jobs. This is one factor leading workers to organize, including the creation of AWU at Google.

There is very little union representation in the sector, and the workers (regular, contract and gig) have few if any avenues to address workplace concerns centered around wages, benefits, discrimination, sexual harassment, promotion, retirement, health and safety, and career advancement. This, too, demonstrates how the technology sector reflects broader trends in the U.S. economy, such as declining private-sector unionization rates, which are currently lower than before 1939.

We need our federal and state public policies to ensure the technology sector remains viable and sustainable in Washington state for generations to come.

ABOUT THE AUTHORS

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Kimberly Earles received a Ph.D. in Political Science from York University in Toronto, Canada, focusing on gender, employment, and social policy. She has completed research projects for the National Action Committee on the Status of Women, the Law Commission of Canada, and the Washington Education Association on topics as varied as local and global gender issues, political representation and democratic governance, and gender compensation for educators. In 2020 she published *The Gender Divide in the Tech Sector: A Plan to Address the Bias and Change the Culture*, for the Washington state Labor Education and Research Center and SEIU 925.

MARCUS COURTNEY

Marcus Courtney is an independent public affairs consultant based in Seattle, WA. He recently served on the Washington state Future of Work Task Force and started the first union for tech workers in the United States, WashTech/CWA, while a temporary worker at Microsoft. Marcus also was the head of department for the telecommunications and technology sector at UNI Global Union an international trade union federation based in Switzerland.

APPENDICES

Appendix A.
Share of Tech Sector Occupational Workforce by Ethnicity by: a) Foreign-Born Workers; and b) Overall Tech Occupational Workforce, Washington State, Economywide, 2019

Ethnicity	Share Foreign-Born Tech Occupation Workforce	Share of Total Tech Occupation Workforce
Asian Indian alone	34.4%	12.2%
White alone	27.0%	9.6%
Chinese, except Taiwanese, alone	19.7%	7.0%
Two or More Races	3.2%	1.1%
Korean alone	2.6%	0.9%
Black or African American alone	2.1%	0.7%
Vietnamese alone	2.0%	0.7%
Filipino alone	1.9%	0.7%
Some Other Race alone	1.2%	0.4%
Japanese alone	1.1%	0.4%
Taiwanese alone	0.9%	0.3%
Pakistani alone	0.7%	0.3%
All combinations of Asian races only	0.5%	0.2%
Nepalese alone	0.4%	0.1%
Cambodian alone	0.4%	0.1%
Other Asian alone	0.3%	0.1%
Bangladeshi alone	0.3%	0.1%
Indonesian alone	0.2%	0.1%
Thai alone	0.2%	0.1%
Laotian alone	0.2%	0.1%
Sri Lankan alone	0.2%	0.1%
Burmese alone	0.1%	0.0%
Guamanian or Chamorro alone	0.1%	0.0%
Samoan alone	0.1%	0.0%
Other Native Hawaiian and Other Pacific Islander	0.1%	0.0%
Malaysian alone	0.0%	0.0%
American Indian and Alaska Native, not specified	0.0%	0.0%
Tongan alone	0.0%	0.0%
Mongolian alone	0.0%	0.0%
Apache alone	0.0%	0.0%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates – Public Use Microdata Sample 2019 (2020).

Appendix B.
Employment Shares in Leading Tech Occupation by Ethnicity (Economywide)
The chart below breaks down ethnic representation for the largest (those covering 80% of all tech occupational employment) computer and software occupations economywide in 2019. For example, worker identified as "Asian Indian alone" represented more than 20% of software developer positions across the economy. These estimates do not differentiate based on immigration status, however.

Occupation	Ethnicity	Within Group Share (%)
Software Developers	White alone	55.4%
	Asian Indian alone	20.4%
	Chinese, except Taiwanese, alone	12.8%
	Two or More Races	3.5%
Computer Support Specialists	White alone	78.4%
	Two or More Races	4.9%
	Asian Indian alone	2.5%
	Black or African American alone	2.4%
Computer Systems Analysts	White alone	71.9%
	Asian Indian alone	8.2%
	Chinese, except Taiwanese, alone	4.8%
	Two or More Races	4.4%
Computer Programmers	White alone	77.0%
	Asian Indian alone	5.8%
	Chinese, except Taiwanese, alone	5.7%
	Two or More Races	4.5%
Network And Computer Systems Administrators	White alone	76.5%
	Two or More Races	8.1%
	Asian Indian alone	4.4%
	Black or African American alone	3.0%
Software Quality Assurance Analysts and Testers	White alone	64.3%
	Asian Indian alone	16.2%
	Chinese, except Taiwanese, alone	9.4%
	Two or More Races	3.7%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates – Public Use Microdata Sample 2019 (2020).

Appendix C.
Foreign-Born Workers as Share of Computer and Software
Occupational Employment in Washington State (Economywide), 2019

Occupation	Share Foreign Born
Software Developers	51.1%
Computer And Information Research Scientists	50.9%
Software Quality Assurance Analysts and Testers	35.8%
Database Administrators and Architects	27.9%
Computer Systems Analysts	24.9%
Computer Programmers	23.9%
Computer Network Architects	23.8%
Web Developers	19.8%
Network And Computer Systems Administrators	19.3%
Web And Digital Interface Designers	18.4%
Computer Occupations, All Other	17.8%
Computer Support Specialists	16.8%
Information Security Analysts	12.2%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates – Public Use Microdata Sample 2019 (2020).

Appendix D.
Share Foreign-Born Workers by Ethnicity for Computer and Software
Occupational Employment (Economywide), Washington State, 2019

Ethnicity of Foreign Born Worker	Share of Total Tech Occupation Workforce
Asian Indian alone	12.2%
White alone	9.6%
Chinese, except Taiwanese, alone	7.0%
Two or More Races	1.1%
Korean alone	0.9%
Black or African American alone	0.7%
Vietnamese alone	0.7%
Filipino alone	0.7%
Some Other Race alone	0.4%
Japanese alone	0.4%
All other	1.6%
Total	35.5%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates – Public Use Microdata Sample 2019 (2020).

Appendix E.
Leading Tech Company Applicants for H-1B Visas in Washington State, Fiscal Year 2019

Employer	H-1B Certified Applications	Share
AMAZON	11,140	30.9%
MICROSOFT CORPORATION	8,980	24.9%
EXPEDIA, INC.	1,270	3.5%
INFOSYS LIMITED	1,090	3.0%
FACEBOOK	990	2.7%
ORACLE AMERICA, INC.	820	2.3%
HCL AMERICA, INC.	810	2.2%
GOOGLE LLC	670	1.9%
UBER TECHNOLOGIES, INC.	620	1.7%
SERVICENOW, INC.	590	1.6%
TATA CONSULTANCY SERVICES LIMITED	410	1.1%
WIPRO LIMITED	350	1.0%
MINDTREE LIMITED	310	0.9%
TECH MAHINDRA (AMERICAS), INC.	260	0.7%
COGNIZANT TECHNOLOGY SOLUTIONS US CORP	220	0.6%
CYIENT, INC.	220	0.6%
Remaining 20%	*7,350*	
Total	**36,100**	

Source: U.S. Department of Labor Employment and Training Administration, Office of Foreign Labor Certification (2021).

ENDNOTES

1. Washington Tech Industry Alliance (2015).

2. All interviews occurred via zoom, telephone, or email in February, March, and April 2021 and all worker interviews were anonymous.

3. North American Industry Classification System codes are used to approximate these subsectors (Exhibit 1). These codes are then applied to the Quarterly Census of Employment and Wages series, published by the U.S. Bureau of Labor Statistics, to quantity employments by subsector.

4. According to a study by the Washington state Department of Commerce, gig workers employed through tech platforms (e.g., Uber, Lyft, Instacart) represented an estimated 1.7% of the state workforce in 2017; this compares with a national average of 1.1%. Overall, across tech and non-tech-related sectors, independent contract workers represented 9% of the state's workforce in 2017, compared with 8% nationally. Although no multi-year estimates of gig workers in Washington is available, "non-employer establishments," a classification that includes gig workers but also sole proprietors and partnerships, increased by 15% between 2008 and 2016, compared statewide nonfarm employment growth of 14% over the same period. In 2019 there were 31,543 Uber and Lyft drivers licensed by King county, almost all of whom provided services in Seattle (Parrott & Reich, 2020).

5. This sectoral estimate relies on a list of North American Industry Classification System (NAICS) codes that together constitute the tech sector. NAICS codes, however, present numerous limitations. For example, in federal and state employment datasets, each employer receives one and only one NAICS code, though this can vary for subsidiaries and large business units. In some cases, IT staffing agencies are classified in federal and state records (Quarterly Census of Employment and Wages) as IT firms, such as software publishers or computer services, whereas others are classified as temporary staffing agencies (and thus not captured in the sectoral definition presented in this report).

6. Washington state Office of Financial Management (2021).

7. Cook (2020).

8. Representative of this kind of myth-propagating discourse is a 1998 report from AeA (formerly American Electronics Association) and Nasdaq, Seattle tech workers earned, on average, $129,300, the highest in the nation for the tech industry at the time. The report further argued that the average wage for software workers at the time was $288,300, while the average wages in the remainder of the tech industry were in the $50,000-$60,000 range. The report overlooked how the top 10 percent of tech workers were earning $79/hour or more, the bottom 10 percent earned just $14.44/hour or less, and this does not include staffing agency contractors. The 1998 report and Wall Street journal article overlook that the structure and range of wages in the tech sector vary widely.

9. MacMillan (2018).

10. Long (2021b).

11. A young male well-paid engineer at Amazon who has been in his role for three years revealed to us that he is looking for new work, something where he feels more invested in the results, and not at Amazon, which is generally viewed as the "evil empire" in the Seattle area. This demonstrates the nuances of job quality within the tech industry, where there is a real dissatisfaction with work that provides lack of fulfillment, even if it is well compensated.

12. Davis (2020).

13. Note: it is not easy to calculate wages for the tech workforce for specific occupations in the tech sector alone so this data represents tech workers across all industries. However, since 85 percent of all tech workers are located in the tech industry, it does provide an accurate picture of what workers are making in the tech industry.

14. Weil (2014).

15. Parker (2020).

16. Facebook (2020).

17. McIntyre (2020).

18. Amazon (2020).

19. Google's annual diversity report intersectional data reveals higher rates of men than women in each of the racial categories tracked for overall employees and leadership, with one exception for Native Americans, Alaska Natives, Naitive Hawaiians and Other Pacific Islanders in leadership, where the numbers are incredibly low for both men (0.2 percent) and women (0.3 percent) (Parker, 2020).

20. Chang (2019).

21. Amazon does not make such data publicly available.

22. Earles (2020).

23. Earles (2020).

24. Wakabayashi (2017).

25. Earles (2020).

26. Snyder (2014).

27. Del Rey (2021).

28. Del Rey (2021).

29. Long (2021a).

30. Long (2021b).

31. Earles (2020).

32. Kosoff (2019), Chang, Green, & Paskin (2018), Peluso, Baird, & Kesterson-Townes (2019).

33. Keep Washington Working Workgroup (2020).

34. Hira & Gopalaswamy (2019).

35. Hira & Gopalaswamy (2019).

36. Costa & Hira (2020).

37. Hira & Gopalaswamy (2019).

38. Bishop (2014).

39. Bishop (2015).

40. Bishop (2014).

41. Wakabayashi (2020).

42. Parrott & Reich (2020).

43. McFeely & Pendell (2018).

44. Expressed at the highest level in Google's 'Don't Be Evil' motto, which was part of the company's corporate code of conduct from 2000 until it was removed in 2018.

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