A WAY FORWARD

WHAT'S REALLY HOLDING BACK DIVERSITY IN TECH?

JANUARY 2023

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As told to Technical.ly

EDWARD THINKS HE'S DOING ENOUGH. IS HE?

He's the founder and CEO of a fast-growing software startup with more than 100 employees. The company is one of dozens of emerging tech companies that took root over the last decade in Center City, the historic business district of Philadelphia — one of the most diverse cities in the United States.

Two in five city residents are Black; 15% are Hispanic and almost 1 in 10 are Asian. A half-dozen languages are spoken natively by at least 10,000 of the city's 1.5 million residents.

Decades ago, modern software culture blossomed in whiter, wealthier Silicon Valley. Surely, Philadelphia's tech workforce would be more diverse. Yet when Edward's team sought to increase the diversity of its engineering team, they looked elsewhere.

"When we went remote, we immediately saw the demographics of our applicants improve," Edward said. "Atlanta particularly has been a place where we found more diverse tech talent than in Philadelphia — because tech is still not as dominant a part of the Philadelphia economy."

In late 2019, Philadelphia's tech economy was going in the right direction. Nearly 110,000 people were in tech jobs, including 27,000 software developers — making the region a top 10 market for one of the modern economy's most coveted trades, per the Economy League of Greater Philadelphia.

That was an 18% increase since 2012, or a steady 2.5% annual growth rate.

Then the COVID-19 pandemic changed everything. For one, the Philadelphia region saw its first decrease in overall tech employment, despite an influx of temporary remote workers. (See chart 1.) This trend was also observed in other major cities across the United States, as workers quit jobs and migrated. For two, pandemic remote hiring left tech employers, like Edward, to compare their city to other workforces.

In 2012, Philadelphia's tech workforce was arguably more diverse than national averages. By 2018, the region had lost ground. (See Chart 2.) Data during the pandemic period are especially distorted but interviews with tech employers suggest Philadelphia is far from a reputation as a diverse tech hiring hub.

Philadelphia's tech workforce is whiter than national averages, and Black and Hispanic residents hold a smaller share — though the rate of Hispanic tech workers doubled between 2012 and 2018.

"Philadelphia may be diverse as a city," said Edward, the CEO. "But tech is not diverse as an industry."

Tech jobs in Philadelphia region
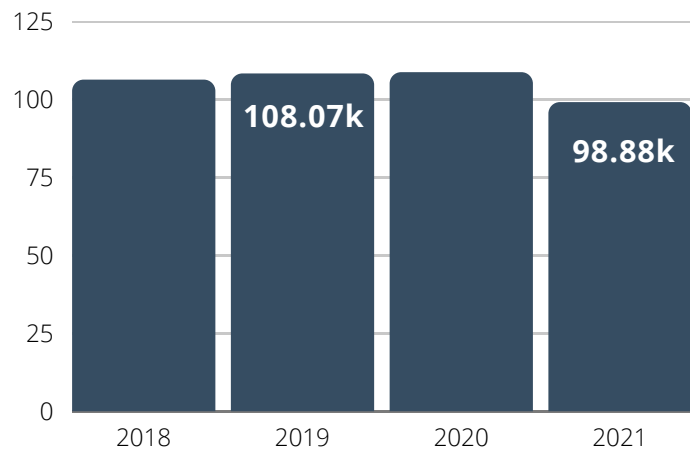
Data via Economy League, obtained from annual estimates of the 2012 through 2021 U.S. Bureau of Labor Statistics' Occupational Employment Statistics (OES) program

Demographics of 'Computer and Mathematical Occupations' Employment

| Race/Ethnicity	Philly in 2012	Philly in 2018	U.S. in 2012	U.S. in 2018
Non-Hispanic White	67.9%	64.1%	66.7%	62%
Asian/Pacific Islander	18.8%	19.6%	17.8%	19.6%
Black	8.8%	7.36%	7.2%	7.9%
Hispanic	3.3%	6.6%	6.2%	7.7%

Source: U.S. Bureau of Labor Statistics' Occupational Employment Statistics

In contrast, though it too suffered a tech workforce shrinking during the pandemic, Atlanta has a higher concentration of tech workers overall, and those tech workers make up a higher share of that city's high-income earners, a signal of more senior and coveted tech skills, according to a 2021 analysis by Technical.ly.

Tech jobs are steadily occupying a larger share of big regional economies across the country, including Philadelphia. The pandemic may mark what regions will lead, and who will lag behind.

To be fair, Pennsylvania, especially in the Philadelphia region, remains one of the country's largest tech hubs — especially when including applied health and biomedical. Yet, despite being one of the country's most populous cities and at the center of one of the world's densest economic corridors, Philadelphia underperforms as a middling second tier innovation hub — with the risk of pandemic factors reducing its status further. That won't do for Edward, who has a company to grow.

Concentration of Tech Occupations in Large U.S. Regions (2021)
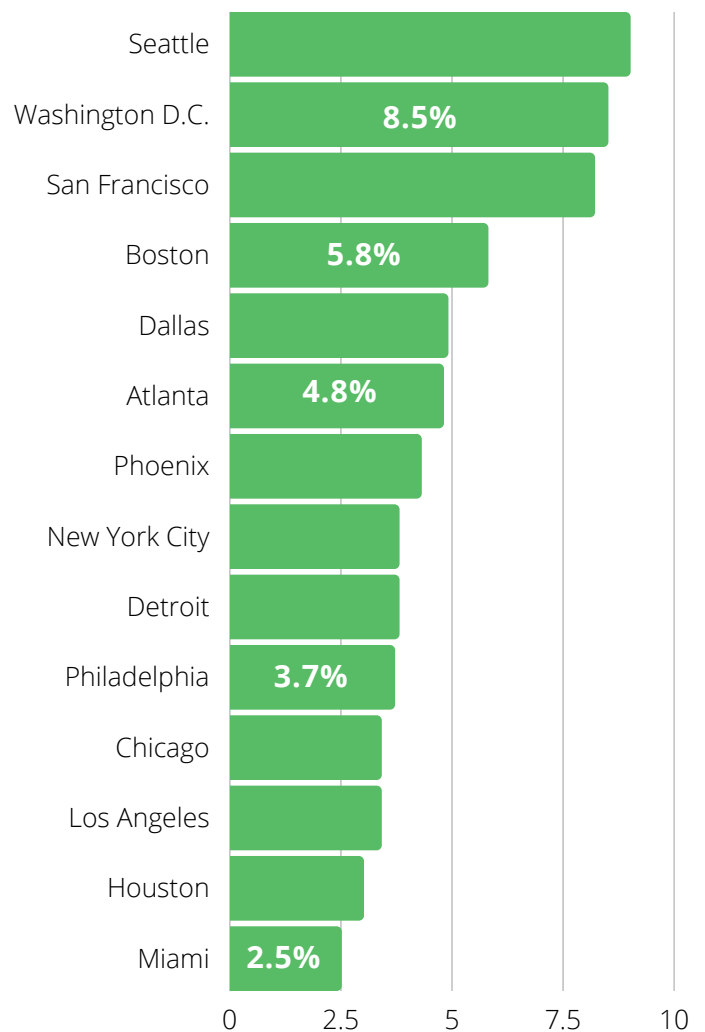
Data via Economy League, obtained from annual estimates of the 2020 and 2021 U.S. Bureau of Labor Statistics' Occupational Employment Statistics (OES) program.

EDWARD IS NOT THIS CEO'S REAL NAME.

He is one of 10 founders, executives and hiring managers interviewed for this inaugural Most Diverse Tech Hub (MDTH) report. We also spoke to nearly as many Black, Hispanic and women tech workers. In an effort to ensure the most unfiltered and honest feedback on the issue of diversifying Philadelphia's technical workforce, Technical.ly spoke to all under the condition of anonymity. We independently verified portions of all of their stories.

Those interviews supplement years of Technical.ly reporting, a general survey of tech employers and 10 month's worth of programming and discussions — monthly webinars, committee meetings — tied to MDTH, an initiative of the City of Philadelphia Department of Commerce's Tech Industry Partnership.

This report's goal is straightforward: Identify specific obstacles to the MDTH coalition reaching its goal of Philadelphia having one of the most diverse technical workforces in the world.

To do that, this report is broken into three parts:

- Background on how we got to where we are now;
- A review of what has been done in Philadelphia to serve as a case study for other regions and
- recommendations on what more can be done.

HOW WE GOT HERE

Philadelphia's tech workforce is by no means unusual in the demographics. The U.S. tech economy has been disproportionately filled with white and Asian men for decades.

Forty years ago this fall, the U.S. Commission on Human Rights held a hearing inside the historic Montgomery Theatre near the San Jose Convention Center on that very topic. Just a decade earlier, a columnist had coined the term Silicon Valley to describe that region's booming computing and chip-making industry.

But already industry disparities were puzzling advocates and policymakers. In September 1982, nearly 20% of California's Santa Clara County population was Hispanic, but they held just half as many so-called "high technology " sector jobs.

Black residents held a somewhat proportionate number of jobs in the sector, but at that time, high technology involved lots of manufacturing jobs. Silicon Valley got its name, of course, because that region was producing so many of the silicon transistors that are used in microprocessors to power the computer age. In contrast, the demographic totals for the professional and managerial roles in IT that we today think of as "tech jobs" were already showing a stark divide.

As an analyst told the commission in fall 1982, at least 83% of high tech professionals were white. When accounting for the fact that people of Asian backgrounds were overrepresented in the tech then, as they are now, you can approximate a baseline.

In 1982, roughly 5% of tech pros were Black or Hispanic. Forty years later, an estimate for the percentage of Black, Hispanic and indigenous tech workers at big tech firms? 5%.

Look across the whole industry and the numbers are better. Better than 15% of the U.S. tech workforce is now made of Black and Hispanic people — half their share of the overall American population.

Share of Black and Hispanic tech workforce: Philadelphia vs. U.S.

Legend:
- Black (PHL)
- Black (U.S.)
- Hispanic (PHL)
- Hispanic (U.S.)
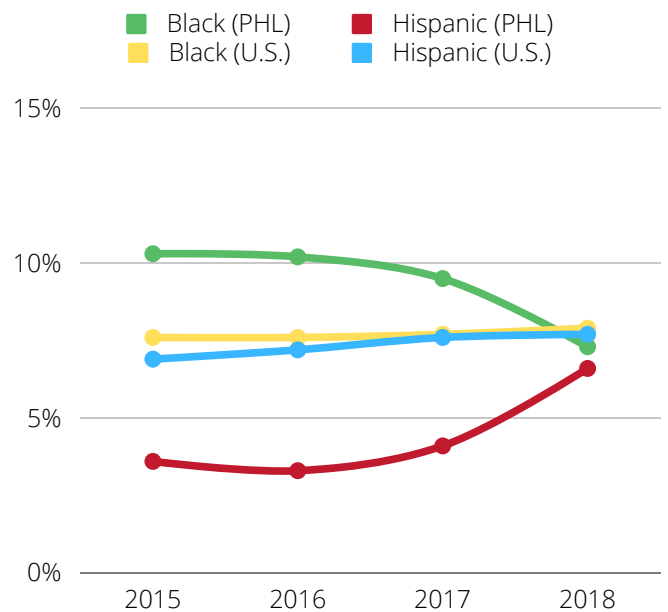
Demographics of 'Computer and Mathematical Occupations' Employment via U.S. Census Bureau's American Community Survey.

Though Philadelphia boosters brag about the region's diversity — including one of the most culturally significant Black populations in the world — the region's tech workforce is now less diverse than the country.

In 2018, a smaller share of Philadelphia's tech workforce was Black than in 2012. One contributing factor is that over that time, a larger percentage of tech employment was employed in the private sector — which was far whiter than Philadelphia's government. One bright light was a doubling of the share Hispanic Philadelphians made of the region's tech workforce but the trend is clear. Overall progress has been slow in an industry that has always been whiter than the United States as a whole.

Entire books and academic careers have sought to disentangle the specific reasons why the industry has enduringly proved so unrepresentative of the populations it served. It is unwise to attempt a comprehensive analysis in such a small space. There are points of agreement.

Broadly, the American tech industry has remained so white and so male for one key reason: the reinforcing nature of network effects. Tech began in spaces that were already white and male, which set an early tone that was reinforced by friends helping friends, and peers inspiring peers.

In 2000, half of U.S. households headed by a white person had a computer and 43% had internet access, according to the U.S. Census. Asian or Pacific Islander householders did even better: two-thirds had a computer and 56% had internet. Those totals were a third and a quarter for Black householders, and similar for Hispanic homes.

As the computing industry matured and the internet was initially commercialized, the academic and social groups first there were already white and male spaces. Despite the best attempts of the occasional obscure commission or report, through the 1980s and 1990s, the die was cast.

It was only after the twin shocks of the so-called Dot Com Bubble burst (2001-2002) and the Great Recession (2007-2009) that a new generation of advocates and champions returned to focus on the gaping divide in representation.

That social focus was aided by an emerging business case as the demand for tech skills began to far outpace the supply of workers with those skills. Diversifying the technical workforce became not just a social good but also an economic imperative.

IT SEEMS FAIR TO ASK: WHY DO WE CARE ABOUT TECH JOBS AT ALL?

Tech doesn't actually represent a big share of the economy.

Among the 15 largest U.S. metro regions, just 4.5% of jobs were in tech. That was even lower in Greater Philadelphia, where the total was 3.7% in 2021, according to an analysis by the Economy League. A different analysis got to a similar total by estimating Greater Philadelphia has 115,450 tech workers, including 27,000 software developers — just a sliver of the region's 2.5 million jobs.

That total is for "tech jobs," like software engineers, data scientists and highly technical roles across any industry. Technologists work in financial services, healthcare, and every industry in between. Contrast that with "jobs in tech," a confusingly similar phrase that implies a subtly different thing: all the occupations at companies whose primary function is to build software.

So, if you're a software developer, whether your company builds software or sells cement, you have a "tech job." Conversely, as a product manager, a digital marketer or an accountant, if your company sells software then you have a "job in tech."

The definitions are messier than we may want. One analysis of tech jobs noted that field specific roles like health technicians and biomedical engineers (which Philadelphia has a fair number of) are typically excluded from tech job totals. They just don't translate well across industries like software developers.

In a place like Philadelphia, those "jobs in tech" represent an even smaller sliver of the economy, since a relatively small number of Philadelphia businesses are in tech. Emerging software startups in Center City and a dense cluster of biotech companies in University City are celebrated exceptions.

Yet tech workforces matter for at least three reasons: They're highly productive; they're well-paid and they disproportionately contribute to a region's well-being.

First, they contribute to overall economic growth by being among today's most productive economic participants. Ideally, technologists build software systems that can then be used repeatedly. In contrast, the barista, carpenter and surgeon have to repeat each act.

Second, that level of productivity and our under-supply of technical skills mean that tech workers tend to be well-compensated. The average tech salary is $100,551, with software developers averaging $105,069, according to a CBRE analysis.

That average for a single tech worker is nearly double Philadelphia's average household median income. Tracking more residents out of careers in lower-paying jobs like retail and instead into more in-demand jobs like tech is a major wealth creator.

Each tech job supports 4.4 'local' jobs
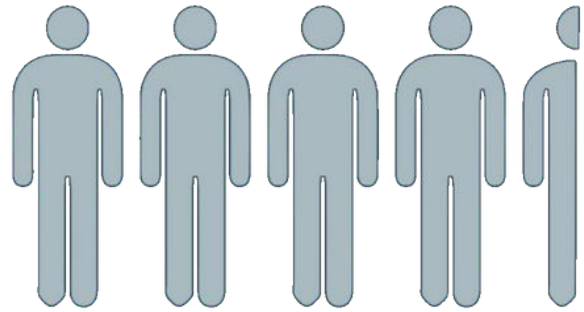
Research by the Bay Area Council Economic Institute; 2021

Taking together productivity and wealth creation, tech jobs have knock-on effects for a region's overall economy. Each high tech job supports 4.4 "local" jobs, according to a recent report from the Bay Area Council Economic Institute — everyone from the carpenter to the barista to the surgeon.

Add a single tech job in a city, and it's as if you've actually added five. That is especially compelling for a taxman who might want to spread the cost of city services across a wider and weather resident base.

What's more, tech jobs are growing faster than many other occupations, making them desirable both for individuals and civic leaders who are thinking about the future.

The first and the third reasons are why city boosters rightly prioritize tech skills — and the second is why it feels especially important for advocates to ensure their workforces are representative.

If tech jobs are so beneficial for a region and simultaneously help people enjoy a higher standard of living, better to remove as many barriers as possible to ensure the highest number of residents can access the industry as possible. One way to evaluate if that's happening is to use demographic data as a guide: Does your city's tech industry mirror your population as a whole?

No large American city has reached that ideal but it gives this initiative its top-level goal. It helps to assess what has been done so far.

REGGIE GREW UP IN NORTH PHILLY.

He did well enough in public school to attend a state college, where he defaulted to a general business program and got a job in the university's computer lab.

That sparked an interest in technology. When he returned home after graduating in 2009 he began a series of small-scale entrepreneurial ventures. He consumed online content on startups and technology voraciously — which is how he came across Technical.ly.

It was the first time he discovered that there was a tech industry in his hometown, and he was inspired by the people and companies he learned about. He took an operations job with a ridesharing company that was expanding to Philadelphia.

"I knew this is what I wanted to do," he said, of working in and around technology and startups. He decided he wanted to get into software development himself.

Via Technical.ly, he applied for and was accepted into a small-scale apprenticeship program at a Center City creative agency, and he began studying every free computer coding resource he could find online. One tech job led to another, which led to another. Almost a decade into his career, he is a senior automation engineer for a software company with 100 employees.

His is an example of the inspiring, if at times chaotic, career journeys of how Black and Hispanic Philadelphians become first-generation tech workers. Reggie benefited from an emerging collection of resources and talent-hungry companies. The number of resources has only grown since.

Consider the four main components of supporting a full talent pipeline of a tech workforce:

- **Future Pipeline** — Increase and improve youth training
- **Workforce Development** — Train mid-career professionals
- **Immigration** — attracting professionals from other countries (or regions)
- **Organizational Dynamics** — Improve the diversity of hiring and retention efforts from tech employers

Each of these four inputs contributed to an underrepresentation of Black and Hispanic professionals in technology.

Take an example of the future pipeline. Participation in a FIRST Robotics program, one of the world's leading youth-focused STEM-learning nonprofits, is heavily skewed white and male, according to a 2020 paper. A longitudinal study published in 2018 showed that FIRST participants were disproportionately more likely to go on to major in STEM fields in college and then pursue technical occupations. No surprise then, that roboticists are overwhelmingly white and male.

Traditionally, workforce development programs have typically been subsidized by a mix of government and industry. Thus, they typically reflect incumbent industries.

Software building is a far newer trade than carpentry or welding, but all have confronted similar labor shortages since the Great Recession. The first proto-coding bootcamps emerged in 2011 from tech talent-hungry Silicon Valley, and its goal was to solve one problem: a shortage of technical talent. Those early programs pulled from people already adjacent to technology, further reinforcing the industry's demographics.

Organizational dynamics play an important role too. Even for the Black, Hispanic and women technologists who make it through various cultural and social obstacles, a tech industry that is disproportionately white and male has developed a reputation for being unwelcoming for those outside that demographic.

Future Pipeline
It's long been clear that the pipeline was broken nationally — which was especially alarming in a diverse city like Philadelphia with a large Black population and growing Hispanic communities.

Fewer than 1,000 Philadelphia city students graduated college with a STEM degree between 2005 and 2010, according to Technical.ly reporting — and less than 1% of Black graduates did. That was from a city with 150,000 kids enrolled, more than half of whom were Black.

Facing stagnant progress within classrooms, social innovators experimented outside of them.

In summer 2013, Sylvester Mobley, a Marine veteran and West Philadelphia native, started a free weekly workshop on the basics of web development and digital literacy for kids at a rec center in Philadelphia's Southwest Center City. He called his effort Coded by Kids. Around that time, Camden-based youth-workforce-development nonprofit Hopeworks, which had its origins in the initial dot-com boom of the late 1990s, increasingly prioritized tech skills to match employer demand.

Estimated 2021 tech job training graduates in Philadelphia
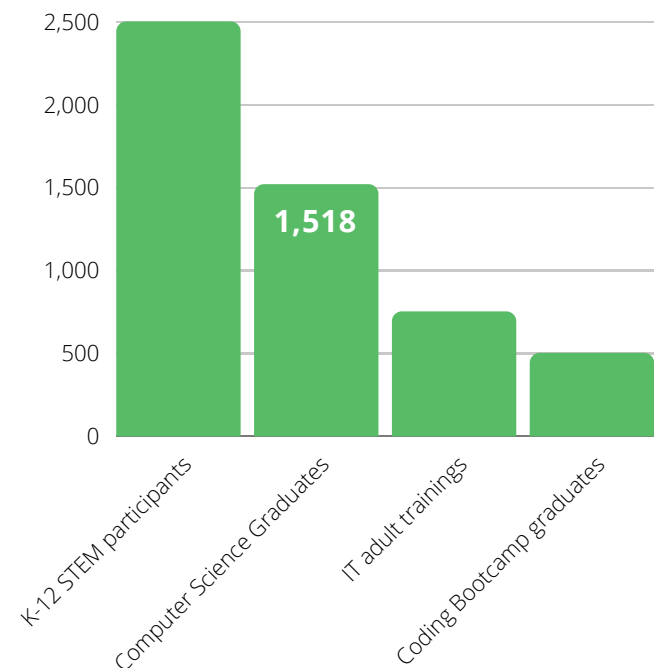
Via a Technical.ly analysis: Estimates from representative sample; K-12 after-school programs; Computer Science degrees including bachelors, masters and doctorate via the College Scorecard; IT trainings and Bootcamp graduates from programs

They both started small: introducing tech skills to fewer than 50 kids a year in a region with nearly 1 million children aged 18 or younger. Over the next decade both established themselves as the region's leading extra-curricular providers of tech skills for kids.

A patchwork of other programs rounded up the region's offering. Some schools developed robotics programs, many associated with the big industry group FIRST Robotics, and other enterprising educators developed their own programs.

All these efforts are aimed at a similar goal: Attract more young people in a diverse city like Philadelphia to take an interest in and stick with STEM skills so that they become more likely to pursue careers in high-demand fields.

In 2022, 6,050 people earned tech degrees in the Philadelphia area, including computer engineering, math/statistics and other tech engineering. But according to a 2019 Campus Philly analysis with Econsult, those who graduate with a computer science degree were the most likely to leave the region.

For academic year 2009-2010, those who earned STEM-related degrees from postsecondary institutions in the United States, were nearly 70% white, more than 11% Asian American/Pacific Islander and 20% split roughly evenly between Black and Hispanic. A decade later, the share of white students was 60%, the AAPI total grew to 12.9% and the Hispanic number surged to 14% — but the Black share shrunk to 8.5%, according to the National Center for Education Statistics.

Tech degree graduates by Race/Ethnicity in 2018-2019
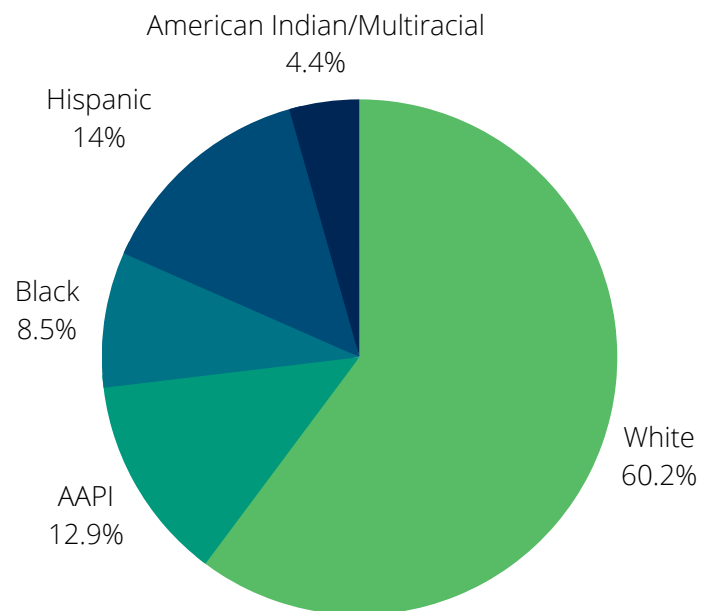
Source: National Center for Education Statistics

Even when including a wider array of degrees, no better than 10% of those currently studying in computer and mathematical fields are Black, according to the U.S. Bureau of Labor Statistics. The Hispanic share of tech degree holders is growing rapidly but behind its share of the overall population. That's one reason why advocates have focused on career changers as a way to replicate the national population within the tech workforce sooner.

Workforce Development

By 2030, the world will be short 85 million tech workers at a cost of $8.5 trillion in lost annual revenue, according to an influential report from Korn Ferry.

Universities alone can't generate enough degree-holders fast enough to respond.

That's powering a focus on "skills-based hiring," in which employers seek applicants with the skills to do a job, whether or not they have a degree or traditional credential. "Performance, not pedigree," as one hiring exec told Technical.ly. That shift opens up the possibility that more tech jobs can be filled by career changers, whom experts consider an important way to fill the 1 million open tech roles in the United States.

Tech degree graduates by Race/Ethnicity vs. U.S. population totals

Race/Ethnicity	2009-2010	2018-2019	U.S. population
White	69%	60.2%	57.8%
AAPI	11.3%	12.9%	5.7%
Black	9.6%	8.5%	13.6%
Hispanic	9.2%	14%	18.9%
American Indian	0.8%	0.5%	2.6%
Other/Multiracial	0.1%	3.9%	1.4%

Source: National Center for Education Statistics; U.S. Census

Two interlocking terms dominate today's economic strategy to support career changers: upskilling and reskilling.

- **Upskilling** refers to improving the capabilities of someone within an existing field — say, a junior web developer trained to take a more senior role.
- **Reskilling** helps transition someone into a more in-demand role, like Amazon's CareerChoice program that has moved warehouse employees to IT functions.

Both are considered opportunities to diversify workforces.

According to McKinsey research: "The fastest and most effective learning interventions happen in the workplace." Employers have invested in building out their programs.

For example, Power Home Remodeling, a construction renovation company headquartered in Chester, Pennsylvania, has invested heavily in software and data, necessitating a large tech team. To fill its talent pipeline, the company launched a code academy focused on transitioning employees into its most needed roles.

Few companies will develop their own internal academy, so far more have turned to coding bootcamps, which have specialized in career changers and advancing junior coders. This corner of continuing education has become the country's most prominent workforce development strategy for tech skills.

The pandemic accelerated the trend.

This model of intensive, weeks- or months-long vocational-style training in basic software, web development and the like has emerged — and consolidated — in the last decade. To some, coding bootcamps are a powerful means for solving a skills gap between a workforce and employers. To others, the model is a scourge, preying on those desperate for job prospects and willing to be sold a dream.

In 2022, Technical.ly reported on allegations of fraud and misrepresentation against a Houston-based tech-skills bootcamp program, part of a national story of impropriety at a fledgling industry of for-profit and nonprofit continuing education programs.

Setting aside a few bad actors, coding bootcamps are not only prominent, they're also the largest contributor of career-changing technologists — though this work remains highly fragmented and inconsistent across providers.

An estimated 33,000 people graduated from 100 U.S. coding bootcamps in 2019, including a dozen online-only versions. Compare that with the 65,000 computer science graduates that American universities graduate each year.

Both are growing fast. Nearly 150,000 people have graduated from more than 100 coding bootcamps serving the United States over the industry's decade of existence. That means nearly a quarter of everyone who ever finished an American coding bootcamp graduated in 2019 alone, and the increase is expected to continue.

Traditional colleges and universities are also expanding to meet STEM demand. In 2009-2010, they conferred fewer than half-a-million math and science degrees. In 2018-2019, that total was more than 750,000, marking 7% annualized growth.
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That's meaningful. Yet it's a testament to the ongoing demand of tech skills that collectively these efforts are still playing catch up. For example, the number of software developer roles in the United States will grow by 22% between 2019 and 2029, according to the U.S. Bureau of Labor Statistics. That is five or six times faster than other role types.

More important still for regional cities like Philadelphia is that the distribution of new tech workers is not equal across the country. The pandemic has shifted living patterns but it's unclear yet how lasting that change is.

Before the pandemic, the overwhelming majority of the country's coding bootcamp graduates lived in the New York City metro and the San Francisco Bay Area — the locations of both the programs and the employers played a role.

Of the 133,000 bootcamp graduates that Career Karma analyzed in 2020, as many as 30,000 were in New York or San Francisco. That's compared to 3,200 in Washington, D.C., 2,500 in Chicago and fewer than 500 in Philadelphia — though the city has welcomed five new bootcamps in the last two years alone.

Where 133k Coding Bootcamp Graduates lived in 2019
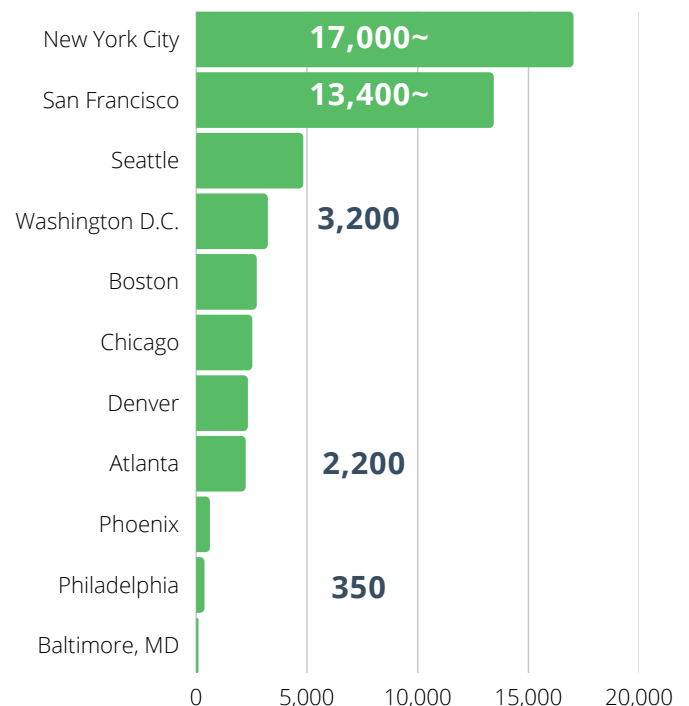
Source: CareerKarma: State of Coding Btoocamp 2020 Report

Coding bootcamps, then, are addressing a technical skills shortage. But not fast enough in enough places. Many graduate with exceedingly junior skill sets, so there is a patchwork of other workforce development-like contributions.

In late 2022, influential artificial intelligence organization OpenAI released ChatGPT, a tool to prompt an AI to generate text, including many coding languages. One influential technologist wryly posted on Twitter: "Where will all the coding bootcamp graduates go now?" Though most tech builders recognize the limitations of AI, it has opened up a conversation for those interested in workforce preparedness. Tech skills become outdated. Knowledge workers need to enter the workforce not only knowing stuff but also knowing how to learn more stuff later.

That's why on-the-job learning is so coveted. Tech still has precious few examples of this.

Apprenticeship programs garner outsized attention but appear to play a relatively minor role. No tech role is even in the top 30 among apprenticeship programs, which are dominated by the building trades, according to a report by the U.S. Department of Labor in 2021. There may be just a few hundred active tech apprenticeships in the country, though Technical.ly's own reporting shows tech companies have frequently tried the model on their own.

Unlike the building trades, though, self-guided learning is far more common among technologists. According to a 2016 survey, fully two-thirds of web developers identified as "self taught," which primarily refers to people following online tutorials and building upon previous mathematics background.
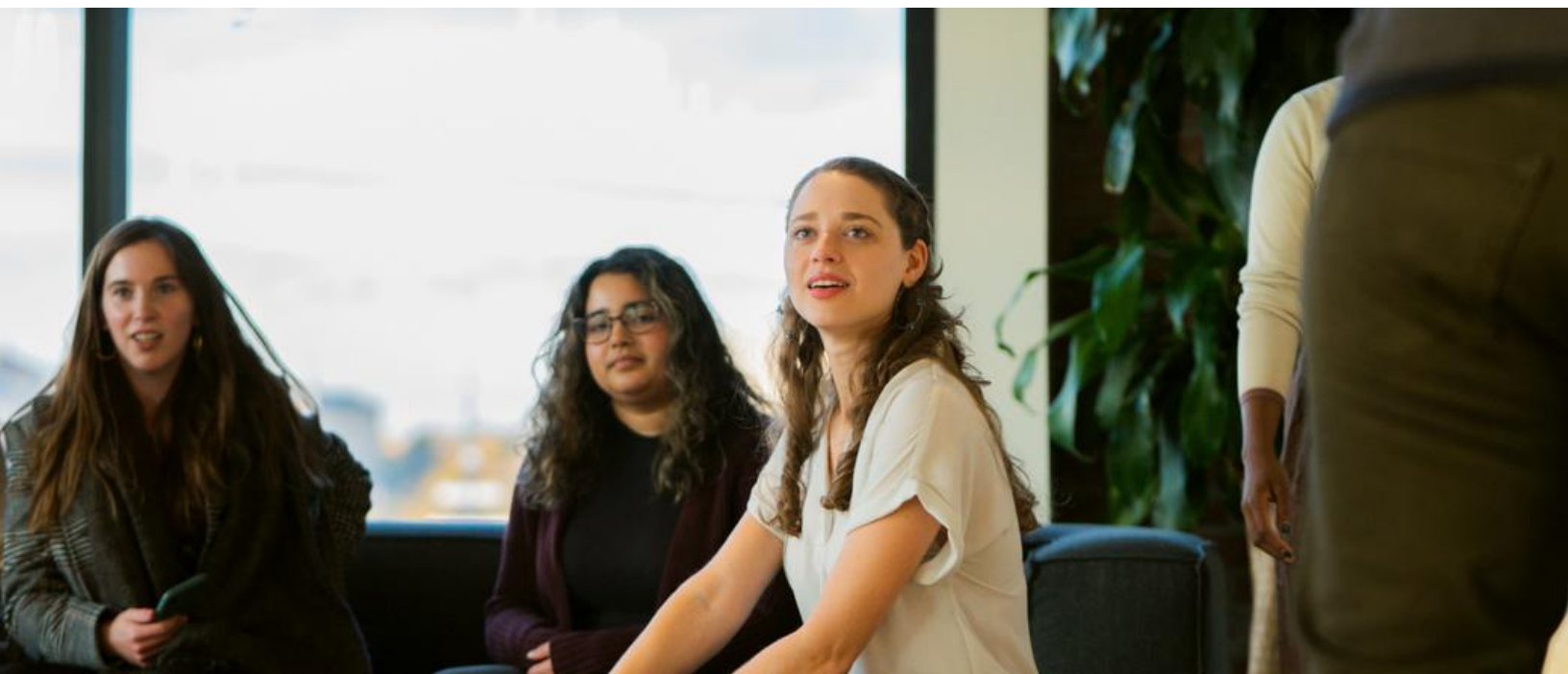
What about diversifying the technical workforce? Coding bootcamps frequently tout their contributions there, with flexible hours and pricing models. Not long after the first coding bootcamp trials in the early 2010s, many began prioritizing diverse students for both social and economic reasons.

Many programs highlight their diverse graduates as a social good. If a 14-week course can earn a 23% salary bump on average, then these programs could combat income and wealth inequality. The message resonated. Nine in 10 career changers reported they moved into tech at least in part because the money was better, according to 2019 research.

Other programs also articulated the economic imperative of more diverse student cohorts: With a shortage of technical skills, underrepresented populations are opportunities to bring new needed skills to the marketplace.

This shortage frequently prompts a question among tech and business leaders across the political spectrum: Can't immigration solve this?

Boost Immigration

In the regional context, immigration can take two importantly different forms. One is the inflow of those born in other countries, and the second is when people move from one region to another. Let's start with the first.

Imagine the privileged cultural position that the United States holds.

More than 750 million adults in the world would migrate to a different country if they had the opportunity, or 15% of the global population, according to a 2018 survey from Gallup. Nearly a quarter of those adults, or more than 150 million people, put the United States as their most desired destination. Canada and Germany were tied for a distant second, each the top pick for 6%.

For all our many political and cultural rifts, to date, the United States remains the most admired, desirable and culturally significant country in the world. This presents a remarkable opportunity to welcome skilled and talented professionals — and an important wrinkle to our understanding of a more diverse technical workforce.

"We get our pick of the best and the brightest, why wouldn't we take that opportunity?" one CEO told Technical.ly. The simple answer, of course, is immigration has become a convoluted and overly political issue.

Public discourse about immigration to the United States turned especially hostile during the Trump presidency, which was overtly opposed to all forms of immigration. Mixing illegal border crossings and easing the burden for highly educated professionals to move here seems a perplexing pairing.

Nonetheless, both impact a key U.S. census figure: the percentage of a city's population that is foreign-born. Cities have historically been immigrant hubs, allowing for the development of familiar and accommodating communities for new arrivals.

Many of the country's most economically vibrant city populations are 20% or more foreign born. Miami, which has sought a reputation as a gateway to Latin and South America, is the country's leader in foreign-born workforce. Silicon Valley cities, New York and Boston all have large foreign-born populations.

In contrast, second tier innovation cities like Washington, D.C., Denver and Atlanta are a step lower.

Philadelphia, which has a long and historic immigrant population, has a strong foreign born population but it remains below that dynamic threshold — though it has outpaced others in recent years.

For economic boosters interested in a diverse and dynamic workforce, it's important to consider who makes up that foreign-born population.

Many economic development advocates then are cautious to focus on the country's best known program for educated workers: the H-1B visa. Like other workforce trends, the distribution of H-1B visas varies heavily by geography. The program has a burdensome reputation and is routinely oversubscribed. In the last decade, the 35,000 or so visas extended each year were filled within days.

Percentage of Foreign Born Residents, Select Peer Cities (2010)
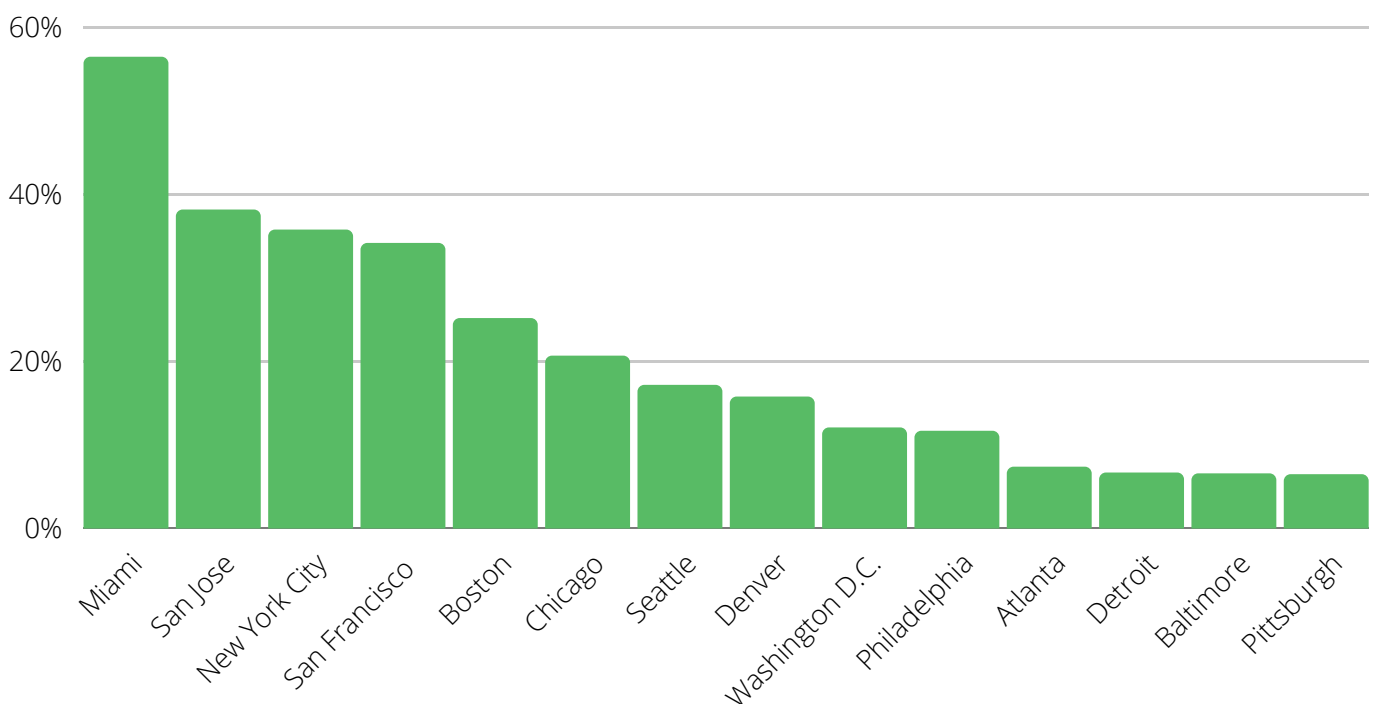
Source: U.S. Census Bureau

Thus big companies dominate the program's usage. Amazon, Meta (parent company of Facebook), Alphabet (parent company of Google) and Microsoft are among the largest users of the program, as are international staffing firms like Infosys and Tata Consultancy Services, according to the Department of Labor.

Though in smaller numbers than big tech, research-focused universities are another common sponsor of H-1B visas, and their work can lead to the commercialization of innovation. This benefits regional cities with strong research institutions. For example, Johns Hopkins University in Baltimore and the University of Pennsylvania in Philadelphia were among the top five of college sponsors of H-1B visas.

Other big employers and a few intrepid growth-stage and mid-sized employers in these cities do participate in the program, including to supplement their tech hiring, though to a lesser extent. The result is the H-1B program is a small but serious contributor to diversifying a region's technical workforce.

This is representative of the hodgepodge approach for team-building that tech employers have been forced to deploy.

"I have an engineer on a visa, and someone who moved here from the Midwest," said Anthony, the CEO of a small product company. "I also employ a small product team in the Ukraine."

With constrained federal immigration, more tech companies have moved to international hiring, according to a four-part Technical.ly report in 2022. (Find the first part here: https://bit.ly/tech-outsourcing)

Number of H-1B visa holders per 100 workers by metro area, 2016
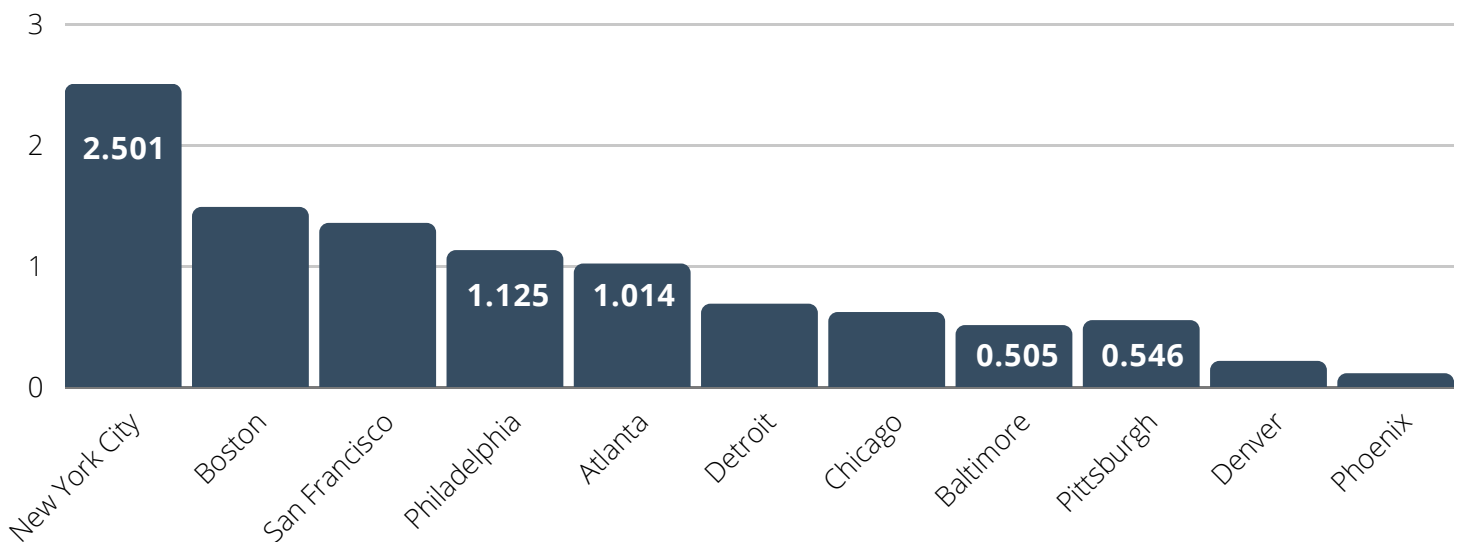
Source: Pew Research Center

Another form of immigration for a region is the free flow of Americans around the country. Contrary to the stereotypes, for years, Americans were relocating less and less.

Between 2018-2019, for the first time since the Census Bureau began recording annual migration statistics in the 1940s, fewer than 10% of Americans changed residence in a single year. It was part of a long, steady trend downward. Still, what in-country movement there was represented a shift to the south and southwest. The U.S. mid-Atlantic and Northeast were net losers in terms of American relocations. Big cities were a welcome exception.The 2020 Census showed that the Philadelphia population grew by a steady, if modest, 5.1%, aided both by immigrants and relocations.

Early in the pandemic, Philadelphia was initially further benefited, as a low-cost, remote-friendly hub. Between March 2020 and February 2021, Philadelphia saw an 8.1% faster in-flow of tech workers than a year prior, according to an analysis of Linkedin data. That put Philadelphia alongside Miami, Houston and Los Angeles as a big winner, as Seattle, Austin and Chicago shed workers. But their number was too small to combat overall trends. The pandemic caught up to Philadelphia, too.

Philadelphia had a net outflow of 25,000 residents between 2020 and 2021, according to revised data from the Census Bureau. Tellingly, though, surveys showed that most Americans moved for personal reasons, with the help of remote work, rather than for jobs that relocated them.

Thus, though immigration and relocations could represent an opportunity, they've played a minor role in diversifying the technical workforce of Philadelphia.

That's a big reason why so many tech employers have looked elsewhere to diversify their workforces.

"I don't think most tech companies are a bunch of suburban white guys anymore," said Kevin, a longtime tech recruiter. "Because there aren't enough suburban white guys anyway."

If more tech employers have more diverse workforces than in the past, a new challenge is emerging. What happens when a workforce gets more diverse?

AMIR WAS THE ONLY BLACK EMPLOYEE OF A SOFTWARE FIRM.

The engineering team was a small team that made lots of off-color jokes in between code sprints in their cramped office. Amir believed in the "go along to get along" and would mostly politely laugh. But one joke really hit hard.

One of the other senior software developers told Amir: "you're only three-fifths of an engineer anyway."

The dark joke was a chilling reference to the infamous compromise of 1787, in which opposing U.S. Congressional factions agreed to count three-fifths of the slave population to determine taxation and representation in the House of Representatives.

Amir later left engineering entirely. He works in tech advocacy roles now. He's working to grow the ranks of Black and brown technologists, but his departure from the field also represents a crucial third part of diversifying technical workforces.

"Even if we had all the Black engineers we needed, if most of these tech workplaces didn't change, a lot of those engineers wouldn't last a year," said Amir.

Resources, public pledges and well-intentioned individuals are not enough to solve technology's diversity problem.

Google had one of the tech sector's' first chief diversity officers. The company helped popularize a focus on diversifying its workforce and has more resources than nearly any other technology firm in the world, thanks to a long-standing near monopoly on search advertising. Yet, just 3.7% of Google's workforce is Black, according to its internal diversity report. It's true elsewhere. Black people comprise 3.4% of Facebook leadership, and 1.7% of technical roles.

"If big tech can't solve this, do you really think some random startup in Baltimore or Philly or one of these cities is going to?" asked one CEO. Maybe smaller is an advantage, said another.

Expanding the future pipeline, improving pathways for career changers and developing immigration policy can contribute to the supply of technologists of wide-ranging backgrounds. Little good if those tech workers find themselves in toxic work environments. This is why economic specialists often add this fourth category to strategies for diversifying workforces: improving organizational dynamics.

This has a dual purpose: educating employers to the importance of diverse workforces which can support demand for technologists of various backgrounds, and improving workplace standards to improve the experience of those workers with new backgrounds.

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In 2022, Technical.ly hosted a monthly workshop series to specifically address these organizational dynamics. With the help of an advisory committee, Technical.ly identified seven of the most common contributors to a workplace that could be described as unwelcoming for tech workers from underrepresented backgrounds.

Each was the focus of an online workshop, complete with a take-home assessment. (An online learning series was produced that employers can still view, in addition to the full unedited workshops, at technical.ly/series/phl-most-diverse-tech-hub)

Those seven workshops serve a worthy review of the organizational dynamics that tech employers are most in need of addressing to ensure their diverse workforces have the best chance to succeed:

- **Creating a culture of belonging**: Audit your workplace culture, including interpersonal relationships, as this will form the foundation of a diverse workforce.
- **Tokenism Without Change**: Implement policies and philosophies to address representation without over relying on existing staff in uncomfortable ways
- **Microaggressions and Their Impact on Mental Health**: Define, identify and address microaggressions and their impact on your own workplace
- **Pay Transparency**: Implement salary bands to avoid cultural biases in income.
- **Recruiting With a DEI Lens**: Recruit with a DEI (Diversity, Equity, and Inclusion) lens and review recruitment efforts to shape company reputation and reach
- **How to Create Culturally Inclusive Job Descriptions**: Review language, assumptions, and qualifications in job descriptions to create culturally inclusive job descriptions.
- **Leveraging Tech Apprenticeships:** Consider implementing tech apprenticeships as a diverse workforce strategy, despite their upfront investment and intensive requirements.

Across these eight sessions, nearly 250 employers were represented, from startups with just a few employees to several companies with more than 500. The online learning course is expected to reach even more. Elsewhere, there is a flood of online content guiding workplace and organizational dynamics with a lens to supporting diverse workforces.

Naturally a key question becomes: What collective goal are all these efforts working toward?
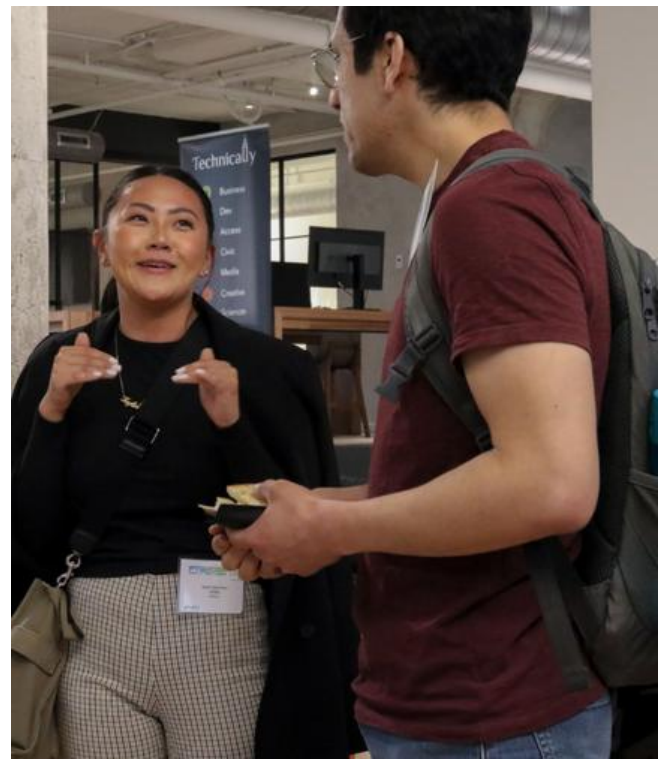
WHAT IS THE GOAL?
Consider a rhetorical question asked by one software consulting CEO we'll call David.

His company signed a lease near Center City in 2019. Between 2020 and 2022, the team's headcount tripled in size and the majority of that growth has come elsewhere in the country, including several hires abroad. Against what demographic standard should he evaluate his company's diversity?

Forty percent of Philadelphia's population is Black, but the Philadelphia region is half that — and under 15% of the United States population is. Black people make up about 8% of Philadelphia's tech workers, a category that includes a range of titles from software developers to computer support specialists to network architects. A similar percentage of the country's 4 million software developers are Black. The CEO's customers, he says, are largely white.

"So tell me," David the CEO said. "If three of my 15-person engineering team are Black, am I doing OK, or am I running a racist company?"

This CEO didn't ask it flippantly, though there was exasperation in his voice. His perspective rang similar to that heard from others interviewed for this report. Efforts to diversify technical workforces have become yet another partisan squabble, they say.

Activists without any experience running companies or hiring technologists label all tech companies as failing to individually solve societal problems that are centuries old, these tech executives complain.

"I'm doing my part, but if a workforce isn't as diverse as we want, is it really the companies that are to blame?" David said. "Where's the blame for the universities? For the workforce development people and the coding bootcamps and anyone else who says they're preparing these tech workers?"

"Can I blame them?"

The general pushback would be that since this is seen as a generations-old problem, there's enough work, and blame, to go around. As any modern tech CEO surely knows, specific, quantifiable cascading goals are the best kind of goals to set.

As a rule of thumb, diverse-workforce advocates start with the premise that most professions should reflect the racial makeup of any given place. That's easier said than done, given the socioeconomic, class and cultural considerations that go into where we work.

For an initiative like the Most Diverse Tech Hub to fulfill its ambition, it's clear that the goal would be for Philadelphia's technical workforce to mirror its population as a whole. That's true across the country.

That would mean Philadelphia's tech workers should be 40% Black and nearly 15% Hispanic — enormous jumps in where we stand now. But dividing the workforce by relatively arbitrary city boundaries does not reflect how most people experience Philadelphia — or any city for that matter. Better yet to use regional demographics.

That still remains a bold stance: Philadelphia's tech workforce should be 20% Black and nearly 10% Hispanic. That would mean more than doubling the rates of Black and brown technologists today.

"Do you really think most tech companies don't want their companies or even their engineering teams to be as diverse as possible?" said Anthony, the CEO from earlier. This is a supply problem, not a demand problem, he argues.

Edward, the CEO from this report's introduction, says he welcomes criticism of him and his peers. He's contributed to efforts to diversify the workforce, but he gives a warning: "After this pandemic, a lot of tech companies are going to be able to say that what happens to Philadelphia matters less to them. If you can hire anywhere, why put your resources into training workers when you can go hire somewhere else where that training is already taking place?"

That gets to the heart of the responsibility for companies generally and specifically to the identity of place. As one tech critic put it: "You don't get credit for doing the right thing."

What's more, as a caution to employers, putting specific demographic numbers down as a goal can feel misleading. As that tech critic put it to Technical.ly: "Equity is a direction, not a destination."

But local tech boosters would be wise to hear that something big shifted during this pandemic. Years of advocacy around ensuring growing local tech economies were invested in benefiting the rest of their hometowns are less sure now. Remote companies and distributed teams just may not be as invested as what pre-pandemic strategies were built on. Now what happens?

What should be done?
Economic theory has a pretty simple solution to the problem of scarce supply: Raise prices.

If there are fewer Black and Hispanic engineers than the market demands, why don't more employers offer to pay them more?

Black men earned less than their equally qualified white male counterparts in 2019, according to a large analysis from Payscale. Several CEOs shared anecdotes arguing that something may have shifted during the pandemic, when the hiring landscape was as competitive as ever and racial justice protests roiled the country.

"But that's all a zero-sum game," said David.

He argued most tech companies are competing for the same under-supply of technologists. A stunning three-quarters of software developers were actively looking or open for new job opportunities, according to a 2022 survey by StackOverflow. WIth low supply, demand ratchets up. Focus further on senior software engineers of color and the numbers dwindle quickly.

In 2021, Technical.ly produced an analysis of high-income earners by industry in a dozen of the biggest U.S. cities. Of particular interest was Austin, the darling of the country's emerging fast-growing tech economies.

In one of the country's most admired tech cities, how many high-earning tech pros were Black? Sixty-three.

Edward, the CEO from this report's intro, understands the scrutiny of tech companies. During the 2010s, in many of the country's most economically beleaguered cities, web and software companies seemed an unusually bright light. In hard-hit neighborhoods in cities like Philadelphia, there seemed very little difference between a small software company and the likes of Google, Amazon or Facebook.

Share of city residents earning $200k+ in "tech" in 2019
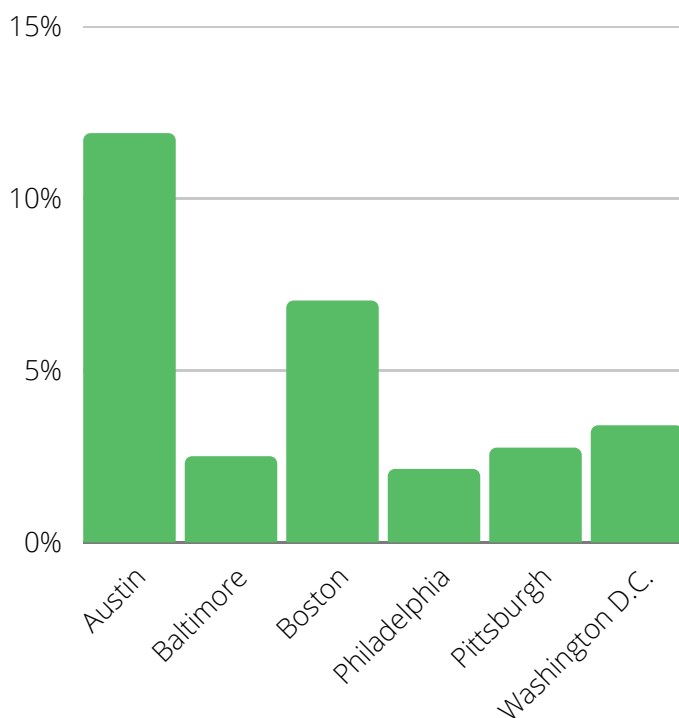
Source: U.S. Census Bureau; Visualization: Technical.ly • *"Tech" refers to NAICS code 541500 Computer Systems Design and Related Services

Share of Black residents earning $200k+ in 2019
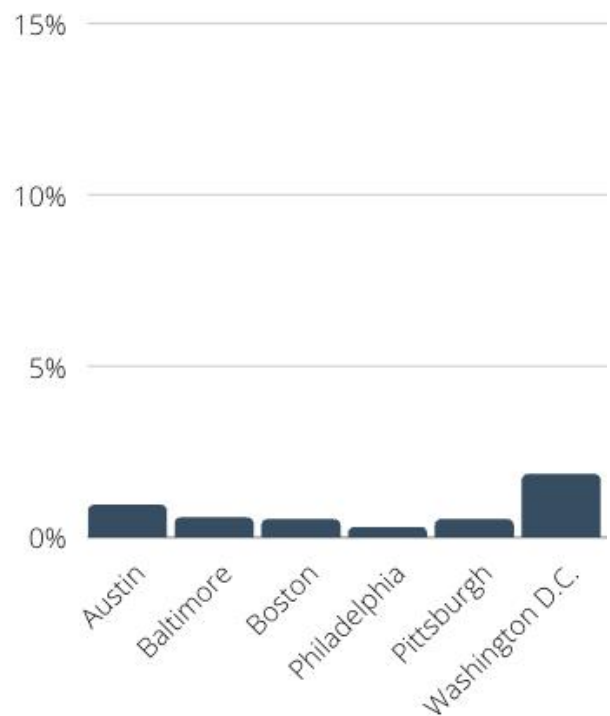
Source: U.S. Census Bureau; Visualization: Technical.ly

After years of reporting and dozens of conversations for this report, what recommendations do become? For the purposes of this report, we argue for at least five:

- **Develop a region-wide economic strategy focused on skills of the future.** Too few consider the scale of the problem, so data analysis and peer-city comparisons should be part of setting goals and describing strategies. The Most Diverse Tech Hub initiative and the Tech Industry Partnership themselves are fine examples for others to follow.
- **Invest in the quality of Future Pipeline programs for STEM skills.** Both in-school and extra-curricular programs already exist to advance STEM skills but education remains a highly politicized debate. Given the sensitivity of working with children, a focus on advancing quality should be prioritized in shaping the long term makeup of the region's future skills building. After-school programs are a particular opportunity.
- **Focus on the quantity of Workforce Development programs.** For adult career-changers and continuing education, growth in scale is necessary. Work closely with employers and professionals alike to routinely test and incentivize the growth of a portfolio of many advanced-skills programs for residents.

- **Encourage improved Organizational Dynamics for regional employers**. Shaping the workplace culture and diversity-preparedness of employers in a given region is arguably more attainable than radically expanding individual workforce development outcomes.
- **Focus on attracting people, not companies**. For decades, economic growth has focused on attracting companies, which would in turn lure residents. The pandemic and remote work will flip this for the most coveted kinds of companies. This presents an opportunity for diversifying a workforce by attracting and retaining people by making the best city to live.
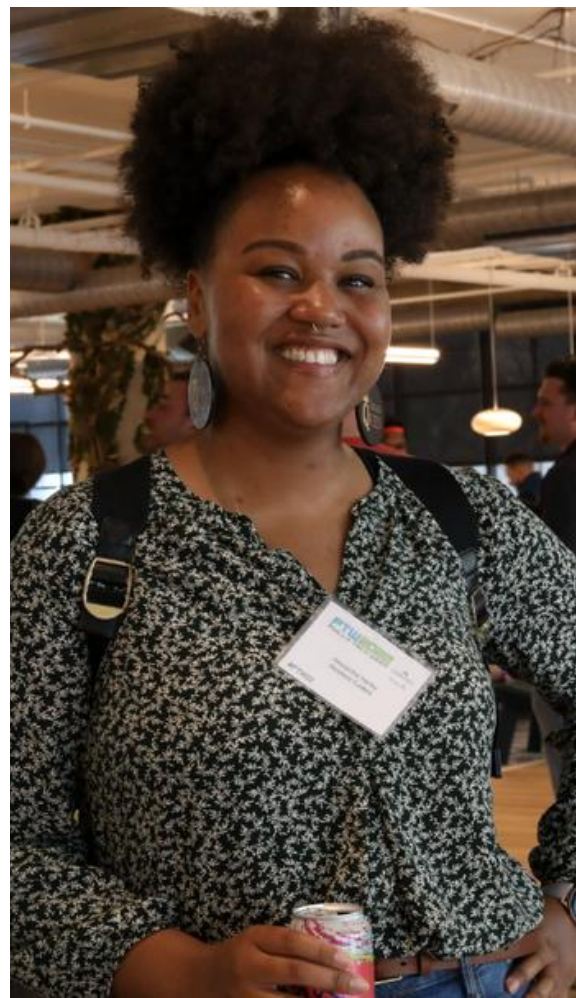
For each of these, it's clear there are three steps: do the work, test the work and then amplify the work. Storytelling becomes a necessary component to ensure others are inspired to follow suit but that's only effective when quality outcomes are ensured.

In the end, this is a centuries old problem. We need a committed, comprehensive and consistent strategy to move forward. Fortunately the work of diversifying a technical workforce has both economic and social benefits. The work has already begun.