


Report - December 2019

# Expanding Tech Apprenticeships in New York City

Tech apprenticeships present a major opportunity for New York to expand pathways into well-paying technology careers, all while strengthening and diversifying the talent pipeline for the city's booming tech sector. New York can do more to greatly expand tech apprenticeships in the city and realize the promise of this powerful model for boosting economic mobility.

by Eli Dvorkin and Judith Messina

- The following is an excerpt from *Expanding Tech Apprenticeships in New York City.*
- Read the full policy brief (PDF)
- View the recommendations

New York City is home to nearly 100 apprenticeship programs today, but the vast majority of them— 93 percent—are in the building trades and manufacturing.[1]

As the demand for tech talent surges, the city has an enormous opportunity to leverage this powerful training model to expand pathways into technology careers.

Arguably the most powerful tool for connecting people with limited technical skills and formal education to the training needed to succeed on the job, apprenticeship is ideally suited to New York City's growing tech workforce. The sector is growing faster and creating more good jobs than any other part of New York City's economy, adding more than 46,000 well-paying jobs over the past decade.[2] Meanwhile, both tech companies and non-tech employers face large and growing tech talent needs, including a more stable pipeline of entry-level workers for middle-skills jobs.

But even as the demand for tech talent grows, Black and Latinx New Yorkers as well as women remain significantly underrepresented in tech occupations. Tech apprenticeships present an important opportunity to change that, providing a proven model for launching underrepresented talent into successful careers.

Given the promise of tech apprenticeship to help diversify the sector while expanding pathways into well-paying jobs, it is striking that so few have taken root in New York City to date. This report finds fewer than 15 programs citywide that are currently applying this model to tech jobs, collectively reaching just a few dozen people each year. Among the city-based apprenticeship programs registered with New York State, just three are in tech occupations. None is currently enrolling new apprentices as of November 2019.

At the same time, a small but growing number of local and global employers are finding success with tech apprenticeships in New York City—including Barclays, Spotify, IBM, and Foursquare—suggesting that emerging interest from New York City's tech sector can be harnessed with the right support. And established programs in Washington State, Colorado, California, and elsewhere are demonstrating that tech apprenticeship can work at a much larger scale.

There are understandable reasons why relatively few tech apprenticeships have gotten off the ground—from limited awareness of the model among tech employers and skepticism that a cumbersome state registration process can adapt to a fast-changing sector to concerns that the city's large number of smaller start-ups lack the bandwidth to expand from core HR duties into apprenticeship development.

But as we detail in this report, it is eminently possible to overcome these barriers and significantly expand tech apprenticeships in New York. Doing so will require support from city and state economic development officials as well as leadership from the city's tech employers. This report lays out several steps to realize the promise of tech apprenticeships in New York.

Based on more than 40 interviews with tech company leaders and HR directors, training providers, city workforce development officials, education experts, and apprentices themselves, this report—the latest in a series of Center for an Urban Future studies focused on the promise of apprenticeship in New York—examines the opportunity to expand the apprenticeship model throughout the tech sector.

Funded by Barclays, a transatlantic consumer and wholesale bank with global reach, the report explores the advantages for workers and employers alike, lays out the current status of tech apprenticeship in NYC, identifies the major challenges to starting and growing apprenticeship programs in tech, and puts forward workable models and approaches from across the country. The report concludes with several achievable recommendations for city and state policymakers, tech employers, and nonprofit workforce organizations, among others, to harness the full potential of the apprenticeship model to expand career opportunities in New York's tech sector.

## The Opportunity to Grow Tech Apprenticeship in New York City

Apprenticeship programs offer a uniquely powerful model for boosting economic mobility. Built to provide workers with a steady paycheck while developing specific job skills and competencies, the model has been proven to boost earnings over the long term—by more than $300,000 over the course of an apprentice's career—while making training and education accessible to job seekers from low-income backgrounds.[3]

For apprenticeships in technology careers, the effect can be even more powerful. Participants in tech apprenticeship programs often progress from minimum wage jobs to full-time salaries of $40,000 or more while in training and $70,000 to $80,000 after receiving a job offer. In many cases, apprentices are accessing these opportunities without college degrees or with just a few college credits. In other cases, apprentices have completed a short course at a bootcamp but otherwise have

no background in computer science or experience working in tech.

“It’s the way to go, the wave of the future,” says Helen Kogan, executive director of NPower in New York, a nonprofit workforce training organization that has developed apprenticeship programs in several states to prepare military veterans and young adults from underserved communities for digital careers. “There are things you can’t teach someone in a classroom that you have to be in the workplace to understand. Successful apprentices are on the train to the corporate tech world. They are getting good jobs—going from unemployment to over $40,000 per year to start. The needle has moved on their lives, their families, and their communities.”

In New York City, with more than 191,000 jobs in the tech sector and 92,000 tech jobs in non-tech companies, leveraging apprenticeship models to help build stronger pathways into these well-paying jobs is a significant but largely untapped opportunity.

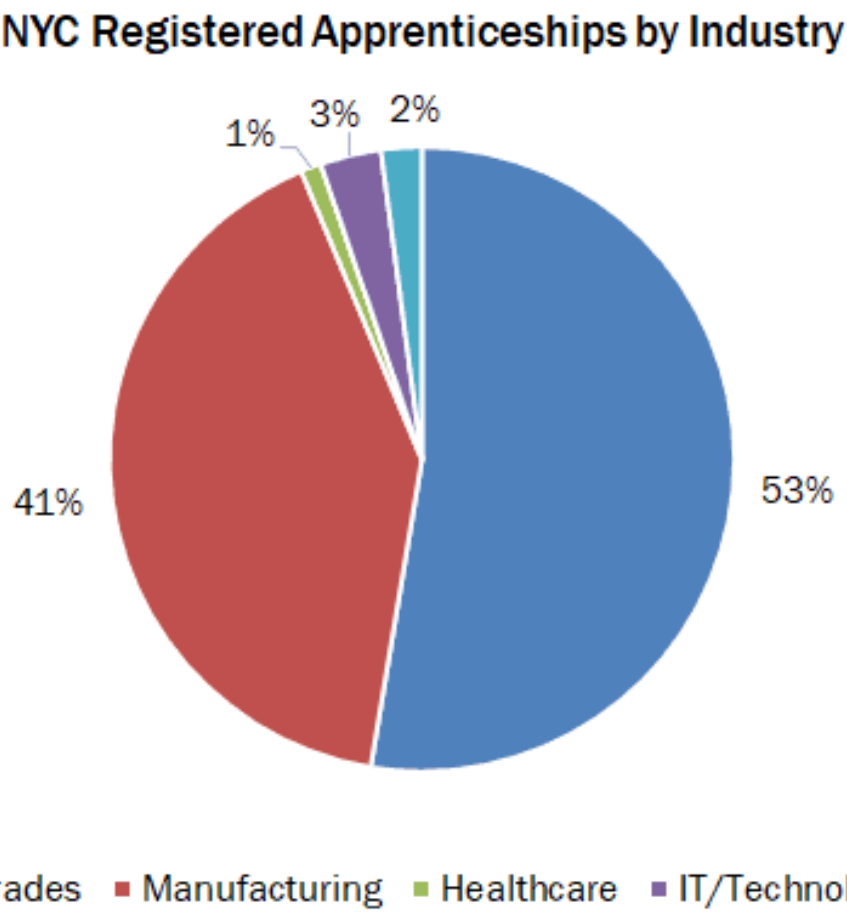
The city is home to more than 9,000 tech start-ups, major offices for nearly every leading global tech company, and thousands of non-tech companies in industries from finance to healthcare that are hiring for a rapidly growing number of tech roles.[4]

But despite the significant potential for tech apprenticeships to help strengthen the talent pipeline for New York City’s tech sector while diversifying the tech workforce, our research finds fewer than 15 programs in New York City today that are using apprenticeship to help hire for tech jobs.

We identified just a handful of large companies—including Barclays and IBM—and fewer than a dozen mid-sized and smaller companies—including Spotify, Foursquare, 2U, and StackOverflow—offering tech apprenticeships in New York City, collectively working with no more than a few dozen participants annually.

“Each program that exists is expanding the notion of where tech talent comes from,” says Joey Ortiz, executive director of the New York City Employment and Training Coalition. “But it’s a handful of individuals in each organization—a drop in the bucket in terms of the numbers of hires these companies require and the number of New Yorkers that could potentially be served.”

Today, the vast majority of New York City’s apprenticeship programs are in the building trades and manufacturing, two sectors that have long been champions of the model. Among the 95 current apprenticeship programs registered with the New York State Department of Labor and based in New York City, just three are for IT or tech jobs and none is with a company in the tech sector—all three program sponsors are electrical contractors. Of the 877 active or pending registered apprenticeship programs statewide, just six are in tech occupations and none is sponsored by a tech company.[5]




Source: Center for an Urban Future analysis of data from the U.S. Census Bureau, 2017 American Community Survey, Five-year sample.

To help spur growth in the number of apprenticeship programs in New York City, Mayor Bill de Blasio and the Department of Small Business Services launched ApprenticeNYC in 2017: a $5 million investment to create 450 apprenticeships in the industrial, health, and tech industries by 2020. This promising initiative is New York City's first government-supported effort to expand the apprenticeship model, and the first cohort of apprentices are already in training for positions as CNC machinists in the advanced manufacturing industry. However, despite the initial goal to expand into the tech sector, the initiative has yet to launch any tech apprenticeships as part of the ApprenticeNYC program.

One notable bright spot is the city's Tech Talent Pipeline, which is partnering with more than a dozen companies—including Spotify, LinkedIn, Stack Overflow, and Foursquare—to develop a fellowship for associate engineers, which is helping to source underrepresented talent for engineering roles and build paid, on-the-job training programs to help entry-level hires succeed. Although these initiatives lack all the features of a multi-year apprenticeship, this industry-driven approach is the city's first attempt to apply an apprenticeship-like model to tech careers.

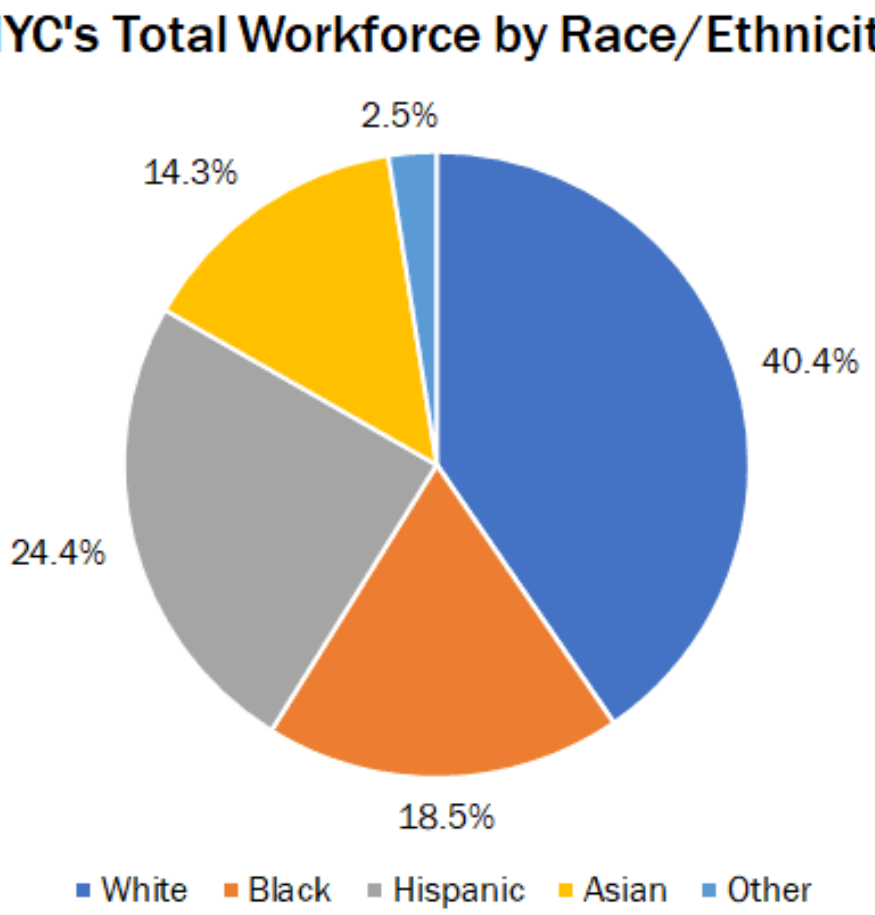
In addition, New York State has launched new efforts to support the expansion of apprenticeship programs into tech occupations. The Empire State Apprenticeship Tax Credit, which went into effect in January 2018, provides employers with a tax credit starting at $2,000 per apprentice for registered apprenticeships focused on in-demand occupations outside of the building trades. In September 2019, Governor Andrew Cuomo announced a $3 million investment in apprenticeship program development at the State University of New York, targeted to emerging fields like artificial intelligence, cybersecurity, and cloud infrastructure.

In the years ahead, New York City is projected to create thousands of jobs in specific tech occupations that have proven adaptable to the apprenticeship model. Occupations including software developers, network security administrators,

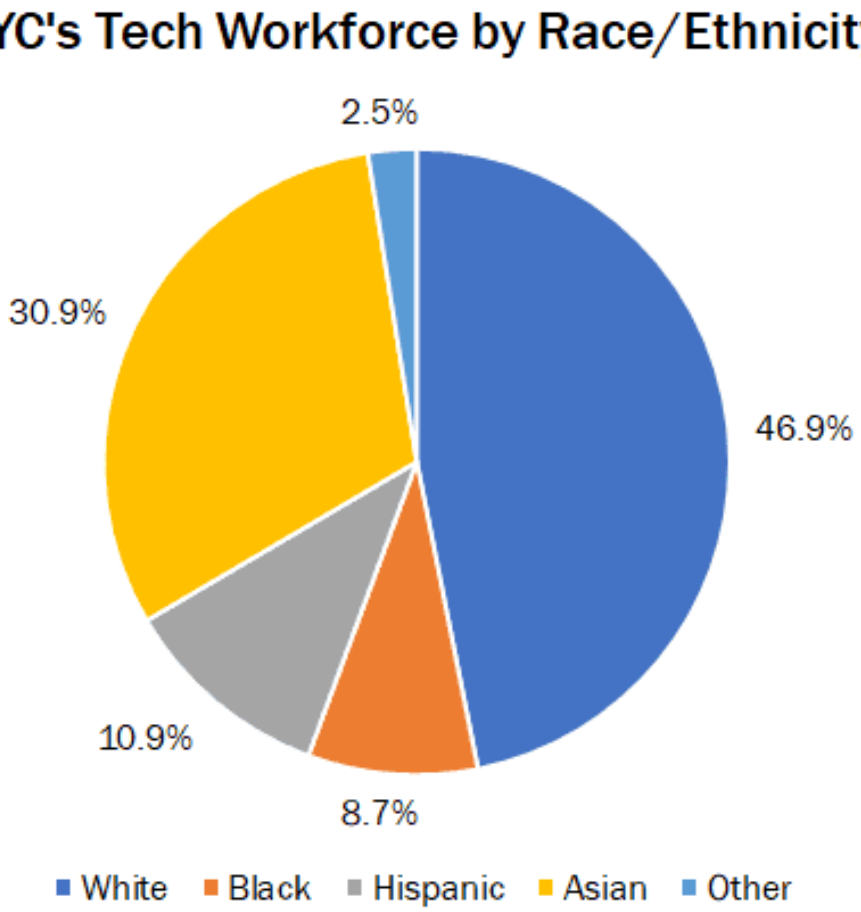
computer systems administrators, IT business analysts, and data center technicians have all been developed into apprenticeship programs in other states and could be launched in New York City.

A major expansion of apprenticeship programs in the city's tech sector could have a profound effect on the goal of expanding economic opportunity. For many New Yorkers from low-income backgrounds, getting on the path to one of these careers can be a major springboard to the middle class. Growing the number of apprenticeships in the tech sector—from dozens today to hundreds or thousands in the next five years—could help to change that dynamic, creating an important new on-ramp to well-paying jobs for New Yorkers without the credentials that typically grant access to these opportunities. At the same time, a major commitment from New York City and State to expand tech apprenticeship can help more New Yorkers become financially self-sufficient and create a ripple of economic activity that will strengthen families, neighborhoods, and the city as a whole.

"We believe that apprenticeship models represent one of the best tools for expanding economic mobility," says Deborah Goldfarb, Global Head of Citizenship at Barclays, "and when combined with a demand-led approach that focuses on where employers are hiring, this model can help create access to jobs that might otherwise be out of reach."




Source: Center for an Urban Future analysis of data from the U.S. Census Bureau, 2017 American Community Survey, five-year sample.




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## Closing New York City's Tech Opportunity Gap

Jobs in technology—whether at major tech companies, in other sectors like finance and healthcare, or in the city's booming start-up scene—are among the fastest-growing occupations paying middle-income wages or higher. Yet Black and Latinx New Yorkers, women, and people from lower-income backgrounds remain underrepresented in tech jobs citywide.

According to our analysis of the 17 major high-tech occupations in New York City's economy, Black and Latinx workers account for 19.6 percent of New York City's tech workforce (8.7 percent Black and 10.9 percent Latinx). Women make up just 24.2 percent.[6]

Our research finds that tech apprenticeships could help close this gap. By combining on-the-job training and classroom instruction with the opportunity to earn a salary from day one, apprenticeships can create pathways for low-income New Yorkers without the postsecondary degrees, work experience, or industry certifications that are often prerequisites for tech jobs—and open doors for New Yorkers from low-income backgrounds who might otherwise be overlooked for opportunities in tech.

There's little question that a traditional four-year college degree remains the most common credential for people in the city's tech workforce, and expanding access to the tech sector for lower-income New Yorkers should include new efforts to boost college success. But given the costs in terms of both time and money required to earn a four-year degree—and competing demands like family obligations and the need to work full-time to cover living expenses—many New Yorkers could benefit immensely from alternative paths to stable careers. In a city where fewer than 23 percent of full-time community college students earn a two-year degree within three years, a paid model of work-based training that meets real employer needs

could provide a powerful boost to economic mobility for far more New Yorkers.

“We’re taking a new and hard look at apprenticeship programs,” says Kenneth Adams, dean for workforce and economic development at CUNY’s Bronx Community College. “We need to work with employers to design training programs and credentials that demonstrate mastery for entry-level, middle-skill jobs in tech that don’t require a bachelor’s degree. There are tens of thousands of those jobs in New York. We’ve got to give people options.”

Apprenticeship can also serve as a powerful tool for connecting youth to the workplace and bringing hands-on, work-based learning experiences into the city’s high schools. For many high school students, the opportunity to explore how skills and knowledge can lead to rewarding careers has a significant motivating effect—introducing goals that mean far more than just a test score.

“We need to rethink how we train young people,” says Barbara Chang, executive vice president at HERE to HERE, a Bronx-based nonprofit that recently launched CareerWise New York, a major new youth apprenticeship initiative. “Apprenticeships are one of the best ways to get young people trained in the workplace—and tech can lead the way.”

## The Benefits of Apprenticeship for New York City’s Tech Sector

Although relatively few companies have launched apprenticeship programs for tech jobs in New York City, the benefits are increasingly clear for those that have.

Across more than 15 interviews with company leaders, engineering managers, and HR directors on the market for tech talent—both within the tech sector and in other industries—three significant benefits emerged that underscore the value of the apprenticeship model: a more diverse workforce, a stronger pipeline of entry-level talent, and a model for future reskilling needs.

### A More Diverse Workforce

Many tech companies in New York City are seeking ways to diversify their tech talent pool. Although the city’s tech sector is more diverse in terms of both ethnicity and gender than other leading tech hubs like San Francisco, Boston, and Seattle, there is still a long way to go until the demographics of tech employment reflect the diversity of the city overall.

Several tech executives and HR leaders we interviewed expressed optimism that robust apprenticeship programs could be an important part of the solution, opening up a talent pipeline that is more diverse in terms of age, ethnicity, gender, educational background, and previous work experience.

“It pays to have a diverse, young talent pool that is eager and has a different perspective than some of the talent that has grown up in the organization,” says Christine Allers, vice president of sales and learning at Broadridge Financial Solutions, a leading provider of communications and data analytics services to financial firms. Five years ago, Broadridge launched an eight-month paid apprenticeship-like program in partnership with NPower, which has been effective for the program’s participants and the company alike. “It’s proven valuable in boosting creativity and in the drive for a young talent pipeline that we’re trying to build,” says Allers.

The latest 14-apprentice cohort at 8th Light, a custom software development firm with offices in New York and four other cities, includes eight people of color and nine women—both significantly higher proportions than the typical talent pool for software engineering roles. Similarly, Pursuit, a Queens-based nonprofit tech training organization that works with companies such as Spotify and Pinterest to train and supply underrepresented talent for apprentice-like opportunities, recruits from across New York City. “Half our cohorts are women and half are Black and/or Hispanic,” says David Yang, co-founder and chief creative officer of Pursuit. “It is important that people from all backgrounds get access to these jobs.”

A more diverse pipeline would provide multiple benefits, according to industry leaders: research shows that diverse teams

perform better, and diverse perspectives in tech are better positioned to meet the challenges and seize the opportunities of an increasingly diverse global market.

“By expanding our approach to talent, we’ve found multiple benefits,” says Hannah Wolf, talent acquisition partner at Spotify, who helps manage the company’s NYC Technology Fellowship Program, an apprenticeship-like model for developing associate engineers. “Creating on-ramps for people who are underrepresented in our workforce today brings more perspectives into the room, people from more walks of life, and allow us to build better products that reflect our users and our platform’s creators.”

**A Stronger Entry-Level Pipeline Amid Rising Competition**

As New York City’s tech sector grows, competition for talent is growing more ferocious by the day. But some tech executives and HR leaders say that competing for experienced talent comes with high costs and insufficient returns. Smaller start-ups cite problems losing out on experienced talent to larger or better-funded tech companies that can offer higher compensation. Meanwhile, large companies in industries ranging from financial services to IT say that demand for middle-skill tech roles such as data analysis and cybersecurity is increasing faster than the supply.

“It’s a war zone,” is the way Matt Kamen, senior vice president of engineering at Foursquare, characterizes the market for tech talent in New York City. “For anyone in the industry, it doesn’t matter what type of company they want to work for, they have huge choice in the market. It’s exciting, but it creates intense competitive pressure. Access to talent is the name of the game, and apprenticeship is a way for us to get access to talent.”

**A Model for Reskilling**

As automation and advances in artificial intelligence transform day-to-day jobs and tasks across a broad mix of occupations, more companies are recognizing the need to develop systems that can enable their workforces to reskill at scale.

With few proven models for reskilling workers efficiently and effectively as business needs change, a growing number of companies see apprenticeship programs as a promising strategy to future-proof their workforces—creating effective systems for developing talent that can adjust as needs change.

“Apprenticeship-like models show you can build an adaptable workforce,” says IBM’s Thomas Wenzlau. “Every organization will need to develop strategies to upskill their workforces as technology and needs change. Apprenticeship models prove it’s possible.

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1. Center for an Urban Future analysis of all registered apprenticeship programs based in New York City, as published on the New York State Department of Labor’s Apprenticeship Sponsor List, November 2019.

2. A November 2019 report commissioned by Civic Hall and prepared by HR&A Advisors, "NYC’s Tech Opportunity Gap,” finds that high-tech employment in New York City increased by 46,000 from 2008 to 2018, including high-tech jobs in both tech industries and non-tech industries.

3. Debbie Reed et al., “An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States,” Mathematica Policy Research, July 25, 2012, https://www.mathematica-mpr.com/our-publications-and-findings/publications/an-effectiveness-assessment-and-costbenefit-analysis-of-registered-apprenticeship-in-10-states. Graduates of registered apprenticeship programs earn an estimated $301,533 more than their peers over their careers, including wages and benefits. For newly created apprentices in tech occupations, that figure is likely to be significantly higher.

4. Center for an Urban Future analysis of data from Crunchbase, a leading global database that tracks tech-enabled start-ups using a mix of public, private, and self-reported sources. Our analysis finds that New York City is home to 9,878 tech start-ups founded since 2008.

5. Center for an Urban Future analysis of all registered apprenticeship programs in New York State, as published on the New York State Department of Labor’s Apprenticeship Sponsor List, November 2019.

6. Center for an Urban Future analysis of the 17 tech-specific occupations tracked in U.S. Census data—such as database administrators, web developers, and computer network architects—using data from the 2017 American Community Survey and employing similar methodology to a 2018 Brookings Institution study and a 2016 U.S. Census Bureau report.

- The following are recommendations from *Expanding Tech Apprenticeships in New York City.*
- Read the full policy brief (PDF)

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## 10 Ideas for Expanding Tech Apprenticeship in New York City

**Create 1,000 new tech apprentice positions in New York City by 2025.** New York City is poised to add thousands of tech jobs over the next six years, including many in occupations that have effective apprenticeship models in other cities across the country. To help expand access to these fast-growing, well paying jobs while diversifying the tech sector, the city should set an ambitious but achievable goal of creating 1,000 new tech apprentice positions by 2025, becoming the leading hub for tech apprenticeship in the process. These apprenticeships should be created with a broad mix of partners, including in-house programs at tech companies; programs operated by intermediaries and training organizations; programs launched in partnership with CUNY; and programs launched by the city's Department of Small Business Services.

**Launch tech apprenticeships as part of ApprenticeNYC.** New York City's first publicly run apprenticeship initiative, ApprenticeNYC started in 2017 with the goal of creating 450 new apprentices in the industrial, health, and tech industries by 2020. But to date, the initiative's only active program is for CNC machinists in advanced manufacturing. The city should make the goal of creating tech apprenticeships a top priority and launch ApprenticeNYC's first tech apprenticeship programs by the end of 2020.

**Develop a NYC Tech Apprenticeship Accelerator to speed the design and approval of new programs.** To make apprenticeship work for the tech sector, the design and implementation of new programs has to operate at the speed of the industry. Cultivating employer partners, designing programs, developing related instruction, and registering programs to enable tax credits can take years—a timeline that's simply too slow for many tech companies to embrace. To speed up the process and help more effective apprenticeship models achieve scale, New York City should launch a Tech Apprenticeship Accelerator. Modeled on a series of initiatives sponsored by the U.S. Department of Labor in 2016, the NYC Tech Apprenticeship Accelerator would facilitate intensive assistance for businesses to jumpstart the development of a customized tech apprenticeship program; bring together interested training partners, educational institutions, and sponsor organizations to connect with employers; and create a platform for ongoing employer engagement and program development.

**Simplify and streamline New York State's apprenticeship registration process.** More than in any other sector, companies in tech say that New York State's lengthy and bureaucratic registration process for new apprenticeship programs—along with rules limiting flexibility in making programmatic changes—present a significant obstacle to greater uptake. New York State benefits from a powerful incentive program, the Empire State Apprenticeship Tax Credit, but very few tech occupations are currently eligible, and no tech companies have sponsored their own programs so far. To ensure that more tech employers start taking advantage of this important incentive, New York State will have to develop a registration process that is simpler, clearer, and more flexible.

**NYCEDC should convene a Tech Apprenticeship Summit to raise awareness of the opportunity.** To develop a larger role for tech apprenticeship in New York City's hiring landscape, more employers seeking to fill tech roles will have to commit to the model. But one major challenge to expanding the model is that relatively few tech employers are aware of the potential in the first place. The New York City Economic Development Corporation (NYCEDC) can play a major role in raising awareness about the value of tech apprenticeship by convening the city's first Tech Apprenticeship Summit: a day-long event bringing together leading local and global tech employers with the training organizations, intermediaries, and educational institutions leading the charge for tech apprenticeship on a national level.

**Support apprenticeship intermediaries to develop end-to-end services for tech employers.** For the vast majority of New York City's tech companies—including small and mid-sized start-ups, as well as larger companies with immediate hiring needs—moving into tech apprenticeship will require the support of a partner organization that can manage the whole process from end to end; develop and implement training; navigate the landscape of registration and corresponding incentives; and support mentorship and management during on-the-job training. The city's economic and workforce development agencies should launch new RFPs focused on supporting these New York City–based intermediaries, including cultivating employer relationships through effective business development, designing and launching new programs, and scaling current models with a proven record of success.

**Bring Apprenti to New York City.** Across the landscape of tech apprenticeship programs nationwide, Washington State's Apprenti program—which has expanded to twelve other states—stands out as a particularly effective and scalable model with a large number of current employer partners. City leaders should bring Apprenti to New York, where many of Apprenti's employer partners like Microsoft and Amazon already have a significant presence.

**Issue a tech apprenticeship challenge grant to spur innovation.** This year, California launched the California Apprenticeship Initiative New and Innovative Grant Program, a $10 million fund to spark innovative apprenticeship programs in emerging industries, with a strong focus on the tech sector. New York State should go one step further and launch a new $10 million challenge grant to support the development of apprenticeship programs in high-tech occupations across the state and make a major commitment to become the leading hub of tech apprenticeship in the nation.

**Launch pre-apprenticeship training programs in technology occupations.** To ensure that a diverse mix of New Yorkers are able to access and succeed in tech apprenticeships, the city should support new pre-apprenticeship training programs in technology occupations. Designed to help level up prospective apprentices who aren't quite ready to learn on the job, these pre-apprenticeship programs would provide an in-depth technical skills boost, along with soft skills focused on navigating the tech workplace, and would feed into apprenticeship programs with employer partners.

**Scale up Tech Talent Pipeline's associate engineering program.** The Tech Talent Pipeline's associate engineering program is a promising model for connecting underrepresented talent with hands-on training and paid apprentice-like positions at growing tech companies. But expanding this program will take new resources to help support business development and employer cultivation, talent recruitment and vetting, and sustained support for associates and employers throughout the course of a program. The city should increase support for this innovative program and enable it to double over the next three years.

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**Center for an Urban Future** (CUF) is an independent, nonprofit think tank that generates innovative policies to create jobs, reduce inequality and help lower income New Yorkers climb into the middle class. For 20 years, CUF has published accessible, data-driven reports on ways to grow and diversify the economy and expand opportunity that are anchored in rigorous research, not preconceived notions about outcome. Our work has been a powerful catalyst for policy change in New York City and serves as an invaluable resource for government officials, community groups, nonprofit practitioners and business leaders as they advocate for and implement policies to address some of New York's biggest challenges and opportunities.

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