



Apprenticeships in the Tech Sector:

Updating a Traditional Model for the 21st Century

August 2020

About this Report

This report lays out a set of findings from interviews conducted with stakeholders who play a role in tech apprenticeships in the Bay Area. This includes employers invested in or interested in tech apprenticeships and training providers, educators, and intermediaries that play a role in preparing and connecting candidates to apprenticeship roles. The information from these interviews has been synthesized and anonymized to provide recommendations on how apprenticeships can more effectively serve as an on-ramp for candidates from underrepresented backgrounds.

Acknowledgments

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The authors would like to thank the Silicon Valley Apprenticeship Consortium and TechSF for their contributions in organizing and completing many of the interviews used in this analysis.

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Executive Summary

Apprenticeships have served as a strategy to help people gain access to jobs through on-the-job training for decades, most notably in the construction trades. While the tech sector is not traditionally associated with apprenticeships, emerging programs in the Bay Area have revealed that applying the on-the-job training apprenticeship model to roles in software engineering and information technology can be a successful strategy—particularly helping to move people to high-wage positions without a traditional four-year degree.

Many tech companies in the Bay Area have already explored hosting apprenticeships or other forms of on-the-job training. Most of the existing programs were created to either build diversity on technical teams or gain a leg up in the tight technical talent market in the region. Regardless of the programs' initial intentions, they all provide insights into the feasibility of expanding apprenticeships in the tech sector.

Through an examination of the operations, successes, and failures of tech companies with existing apprenticeship programs, this report explores the barriers that stand in the way of expanding preliminary apprenticeship programs and uncovers a pathway to successfully scaling apprenticeship programs in the region. The report is based on a set of 30 interviews with employers, training providers, educators, public agencies, and intermediary organizations that all play a role in the operations of the current apprenticeship programs in the Bay Area. The findings from those conversations inform a set of recommended next steps to grow the number of apprenticeship roles that help low-wage workers from underserved communities access high-wage jobs in the Bay Area's tech sector.

While many of these interviews were conducted prior to the COVID-19 pandemic, apprenticeships can take on even greater importance in an economic recovery. Given the job losses across much of the service sector—and uncertainty as to whether or not all of those jobs will return—innovative training programs that can improve workers' career trajectories are paramount for an equitable, long-term economic recovery.

Apprenticeships in non-traditional sectors, such as technology, are one tool that the state and the region can promote to ensure that displaced workers have as many opportunities to re-enter the workforce as possible. There are roles in tech that are ripe for on-the-job training, which can open career pathways to those without a four-year degree and lead to more diversity in the tech workforce.

The following recommendations provide a framework for how tech apprenticeships can grow to serve low-income and underserved populations in the Bay Area through investment, employer collaboration, and communication between employers and training providers:

- 1. Expand connections between training partners that target low-income, underrepresented populations and tech employers with apprenticeship programs.**
- 2. Facilitate partnership between community colleges and non-profit training providers to match rigor of instruction with employer talent needs.**
- 3. Identify a source of financial support for underserved populations, allowing individuals seeking to make a career switch into tech the time to develop soft and hard skills to become competitive apprenticeship applicants.**
- 4. Determine the aspects and costs of apprenticeship programs that can be shared or made more efficient through employer collaboration.**
- 5. Increase access to on-the-job tech training by expanding access to state funding and tax credits for apprenticeships in tech.**
- 6. Increase the appetite and redefine base level qualifications for entry level technical roles.**

Introduction

Technical talent shortages are a growing constraint on businesses, particularly in the Bay Area. The Federal Reserve Bank's 2019 assessment of economic conditions named the technology sector as one of the tightest labor markets in the country.¹ In the Bay Area, this talent limitation has resulted in the cost of tech talent rising to be the highest in the country.² More recently, the COVID-19 pandemic has created employment dislocations across nearly all industries. While the concern of tight labor markets may have abated in the short-term, technical employment is still expected to be an area of growth over the long-term. This crisis also creates an opportunity for new programs that can move those workers that now find themselves unemployed onto higher-wage career trajectories.

As the demand for technical talent continues to increase, the challenge in hiring technical talent becomes more acute. A national survey conducted by Indeed found that 84% of businesses find it challenging to hire technical talent, and 83% say this limitation has hurt their business.³ One key factor hindering tech recruitment is the definition of what a high-quality candidate is in the tech sector. Just under a quarter of surveyed hiring managers reported that an Ivy League degree is 'very important' factor in evaluating technical talent, and 56% cited a computer science degree as an important qualification. Shifting this mindset of what a qualified candidate looks like is a crucial step in addressing these talent constraints, opening up the possibility of reaching untapped pools of candidates, and bringing a more diverse workforce into the technology sector.

Tech apprenticeships are one avenue that can serve as a pathway into technology jobs by helping individuals without a traditional four-year technology degree gain access to the sector. **This report finds that there are numerous direct and indirect organizational benefits linked to tech apprenticeships, but at the high level, employers in the tech industry invest in apprenticeships to either solve a skills gap or to intentionally build diversity on technical teams.**

In addition to the difficulty employers face in attracting technical talent in the Bay Area, talent retention is also an issue. Apprenticeships can serve as a solution to employee retention, as many employers find lower attrition rates among apprentices. Employers have also cited an uptick in employee morale on teams that host an apprentice. Coming together to support the learning and development of a new team member serves as a tool to deepen a team's collaborative relationship. Managers also learn to support and mentor in a new way when they hire an apprentice, thus an investment in an apprenticeship program is indirectly an investment in building managerial skills throughout the organization.

Lastly and most significantly, diverse technical and engineering teams build products that more accurately reflect the needs and behaviors of all potential users. The diversity of thought achieved by having employees from ranging backgrounds and genders that are racially and ethnically diverse results in products that better meet the needs and behaviors of a diverse user base. Apprenticeships are a tool that can expand this advantage that diversity of thought brings to organizations by deepening the pool of technical talent from underrepresented and diverse backgrounds.

This report lays out a set of findings from interviews conducted with stakeholders who play a role in tech apprenticeships in the Bay Area. This includes employers invested in or interested in tech apprenticeships and training providers, educators, and intermediaries that play a role in preparing and connecting candidates to apprenticeship roles. The information from these interviews has been synthesized to provide recommendations on how apprenticeships can more effectively serve as an on-ramp for candidates from underrepresented backgrounds.

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Employer Insights on Tech Apprenticeships

This chapter includes findings from 20 interviews with employers in the Bay Area who either have an existing apprenticeship or on-the-job workforce training program or are interested in starting a program of this sort. The Silicon Valley Apprenticeship Consortium (SVAC), a group of companies with a shared interest in promoting apprenticeships in tech in the Bay Area, was a partner

on this project. The SVAC member companies were the original targets for the employer interviews, as well as additional Bay Area companies identified as having existing apprenticeship programs. Findings from the interviews are aggregated and/or anonymized for company confidentiality reasons.



Creation and Operation of Existing Apprenticeship Programs

Employer motivations for investing in apprenticeships

Interviews revealed two main motivations that businesses have for starting tech apprenticeship programs:

(1) Mission-driven desire to build diversity within their technical teams. Companies that fall into this group see an investment in apprenticeships as an investment in diversity. Those driven by a desire to diversify their tech teams typically run the apprenticeship program through their human resources or diversity and inclusion departments and encourage managers of technical teams to devote head count to an apprentice.

(2) Business-driven talent gap solution. In this scenario, companies that are having difficulty recruiting and retaining tech talent see an investment in an on-the-job apprenticeship style program as an investment in their future technical workforce. In this case, the programs are typically housed within the engineering department, and technical managers themselves drive company buy-in from leaders and other departments.

Where Apprentice Programs are Housed within Companies

Department	Number of Companies
Engineering	6
Human Resources/Diversity & Inclusion	6
Not Yet Established	5
Public Policy/Communications	2
Unique Department	1

Tech apprenticeship program operations

Each company runs its tech apprenticeship program uniquely, but some similarities can be drawn between apprenticeship program operations. Most programs are made up of a combination between on-the-job training onsite at the office of the employer and formal classroom style training at a community college or organization that offers training in tech. Three distinct program structures were identified through discussions with employers.

Only on-the-job training:

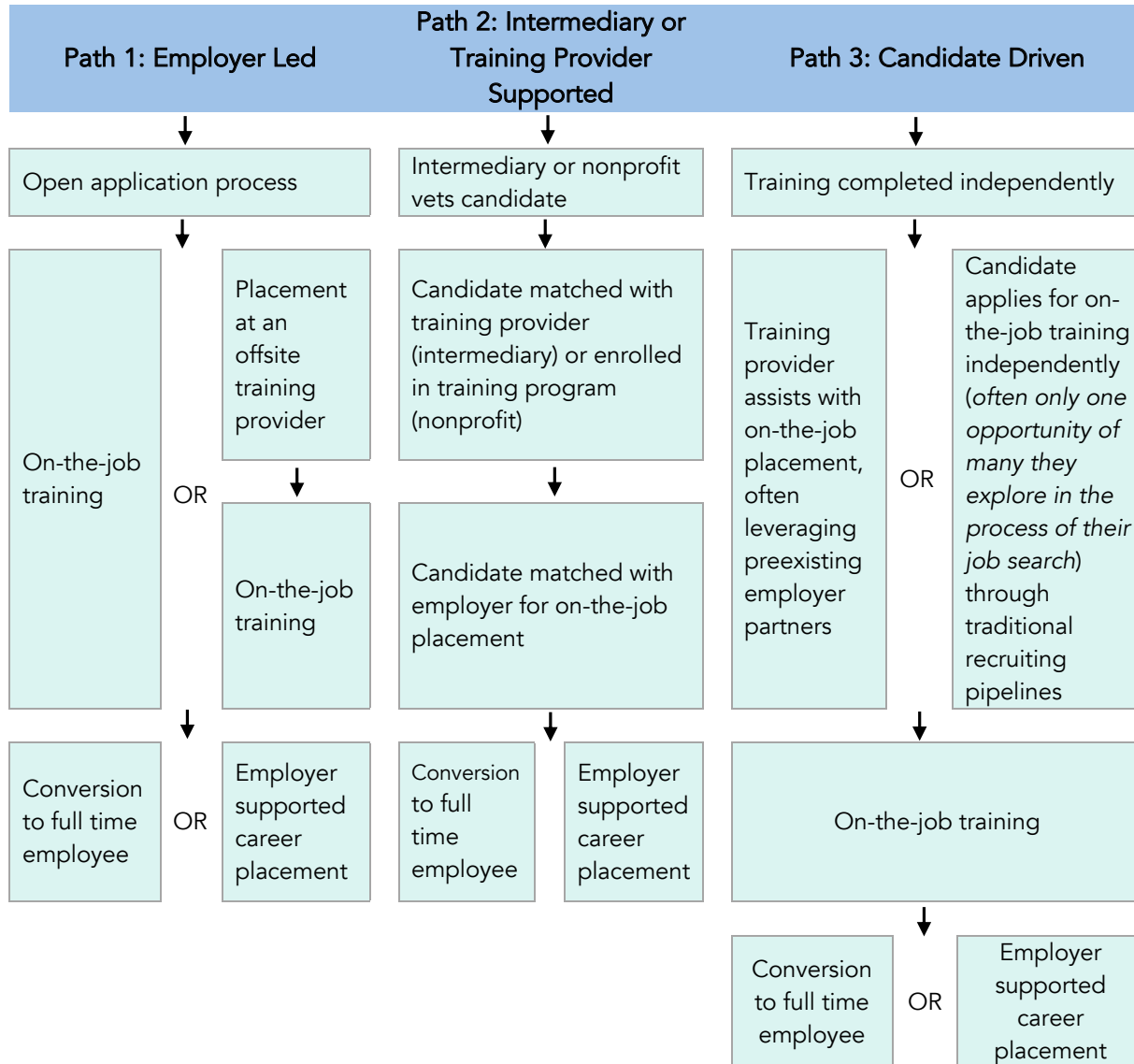
These programs begin with an apprentice being placed directly into a role on a technical team within a company. The length of the placement, commitment from the employer to eventually hire the apprentice as a full-time employee, and the benefits and support offered to apprentices varies. This style of program typically promotes the opportunity through multiple channels, ranging from a traditional job posting on job board platforms, to sharing information with local bootcamps, workforce organizations, and technical training providers.

Formal training followed by on-the-job training:

Apprenticeship programs with this structure identify candidates themselves or in partnership with a training partner. Selected candidates are then enrolled in an external training program to establish base level technical skills tailored to their future on-the-job placement. The length, content, and chosen training partner for the formal training varies by company.

On-the-job training and formal training in tandem:

Companies with this structure hire apprentices and immediately place them on a team, where they devote a share of their time on-site working and a share of their time off-site in formal training. The structure of the formal training ranges from apprentices being given a budget to find training that fits the needs of their professional development, to all apprentices taking the same foundational course through a single training provider.



Operational insights

Several of the companies interviewed had worked through different iterations of apprenticeship programs, and through that process gained insights into characteristics of a successful program. Many highly recommended prototyping a small apprenticeship program prior to investing in a fully-fledged program. Starting with one or two apprentices and slowly integrating them into other teams and roles was a successful strategy for several companies due to the flexibility it built into the program. The fast pace of tech results in the most highly sought-after skills changing

rapidly, and many found that being able to pivot the apprenticeship program to support rapidly changing skill sets was a helpful asset.

In that same vein, among companies that incorporate formal training into their program, many stressed the importance of matching specific engineering skills needed on the technical teams with the training program curriculum. Capitalizing on this ability to dictate the skills the apprentices learn prior to or during their on-the-job training illustrates the benefit that apprenticeships have over traditional hiring practices.

Among the companies we spoke to, the most common role companies placed apprentices into was an entry level software engineering role. The roles available for apprentices are mostly dictated by managers' willingness to commit headcount to an apprenticeship, and the high demand for software engineers increases their appetite.

Lastly, companies that involved the hiring managers directly in the apprentice selection process found that the buy-in and commitment to their success was stronger. Allowing the hiring managers to see the potential from the onset gave them more buy-in on the overall success of the apprentice.

Apprentice Roles at Companies Interviewed

Tech Roles	Number of Companies
Software Engineer	11
IT Services	3
UX/UI Designers	3
Mobile Engineers	2
Network Engineers	2
Site Reliability Engineering (SRE)	1
Data Science	1
AI Engineers	1
Quality Assurance	1
Technical Service Analyst	1
Technical Program Manager	1
Technical Trainer	1
Technical Writer	1
Application Development	1
Mainframe System Administration	1

Scale of apprenticeship programs

- Among apprenticeship programs that are either in early stages or well-established, the largest has hosted 141 apprentices and the smallest only two.

- Typical scale for program in early stages: 2-10 apprentices per cohort.
- Typical scale for established program: 10-30 apprentices per cohort.

Support and mentorship

Each tech apprenticeship program takes a unique approach to supporting apprentices, but there are many similarities between approaches. At a high level, there was a sentiment that the most important factor in mentoring was managerial consistency and multiple avenues of support. For example, giving an apprentice both a technical mentor and a mentor from another department, and having those mentors stay the same for the duration of the program.

Specific support tactics cited by employers include:

- **Cohorts:** Many companies grouped their apprentices into cohorts to provide a foundational level of support and community.
- **Mentors:** In addition to the technical manager that apprentices interact with during their on-the-job training, many companies also provide additional mentors. Forms of additional apprentice mentor include employees who were previously apprentices, advisors from employee resource groups, HR and career development mentors, and a high-level coach from the technical team.
- **Career Support:** Creating connections to HR and offering access to career development resources and trainings can help apprentices envision their career trajectory and understand their options for employment after completing their apprenticeship.
- **Financial Support:** Many employers support apprentices by paying for enrollment in a technical training course or program. Depending on the program, some companies start paying apprentices a salary or stipend when the program begins, even if it starts with several months of training, while others just cover the cost of the training and start paying the apprentices once they move into the on-the-job training portion of the program.

Participants and Pipelines

Hard and soft skills successful apprentices share

While most companies do not place qualifying factors on who is eligible to participate in the apprenticeship program, many have identified characteristics that the most successful apprentices share.

(1) Professional work experience, communication skills, and professional etiquette: Companies cited that apprentices were often more competent in terms of soft skills than candidates coming out of school with a four-year degree, due to the likelihood that they had some professional work experience.

(2) Growth mindset: Self-learners dedicated to a career switch into the engineering field, who take charge of their own learning path. Apprentices that displayed 'grit' and a creative approach to problem solving.

(3) Technical Skills: Candidates with some background in at least one programming language and the understanding of basic technical function.

Typical apprentice profile

The typical apprentice in Bay Area companies is someone re-entering the workforce, making an early stage career switch, or entering the workforce through a non-traditional path without a four-year degree.

- Groups re-entering the workforce include veterans, mothers returning to work, previously incarcerated people, and immigrants.
- Career switchers typically seek tech apprenticeships to direct their careers into a higher-wage industry and commonly have either:
 - A four-year degree in another field with some full-time professional experience in another industry or;
 - Experience in a lower-skilled, part-time, or hourly field paired with some form of self-taught or non-traditional technical training from a bootcamp or short-term training program.

Entering the tech sector is attainable without the support of an apprenticeship, but is limited to those with the financial means to do so. For individuals who have the resources to take time off from work, there are countless technical training programs available at a cost. These programs allow them to build skills that qualify them for entry level engineering roles. However, people in a lower-income bracket without savings are less likely to be able to afford the tuition for this type of program or have the time to complete a program. As such, apprenticeships can offer an attainable career switch pathway for low-income individuals into tech.

Employer and training partner relationships

Most companies integrate training partners into their apprenticeships programming, but the timing and structure of the integration with the educational environment ranges.

(1) Formal relationship: Some companies provide funding for apprentices to attend courses onsite with a single training partner. The training is typically full-time and immersive. The training partners usually play a significant role in the candidate selection process, leveraging their student pipelines to source applicants.

(2) Soft partnership: Companies promote their apprenticeship roles to students enrolled in courses offered by training partners or in the network of intermediaries, but do not support the institutions or students financially. These companies may provide their apprentices with funding to attend courses that help them develop the skills they need to succeed in their on-the-job role but give them free range to pick their own courses. Companies that structure their program in this way often have informal relationships with training partners where their apprentices commonly choose to take courses.

Candidate Pipelines Identified through Employer Interviews

Pipeline	Number of Companies
Community Colleges	9
Apprenti	3
Dev Mission	2
Events/Conferences	3
Organic/Traditional Hiring Platforms	2
Tech Hire Oakland	2
Hack Reactor	1
Hack Bright Academy	1
Tech SF	1
General Assembly	1
Last Mile	1
Onramp	1
Upwardly Global	1
2 Code TL	1
Hack the Hood	1
Neurodiversity Pathways	1
Udacity	1
JVS	1
YearUp	1
Npower	1

Companies expressed several characteristics shared among training providers consistently supplying candidates from non-traditional backgrounds who have strong technical skills. These characteristics include:

- Programs with strong ties to communities underrepresented in tech that are also accessible to learners without four-year degrees;
- Rigorous curriculum focused on project-based and collaborative learning;
- Continued support of apprentices throughout the on-the-job placement;
- Training providers that are able to accommodate curriculum customization to meet shifting recruitment needs.

Intentionally diversifying the apprenticeship applicant pipeline

When one interviewed company first started their apprenticeship program, they leveraged the audience that the head of engineering could reach through a blog about the program. This generated interest from bootcamps, and created a lot of buzz, resulting in a 6,000-person mailing list from organic interaction with the original post. This organic interest highlighted a huge need and demand for apprenticeship programs.

The list grew and served them well for the first few years of operating the program, but the program manager has since decided to put together a more focused applicant sourcing strategy to address the limitations of the organic nature of the mailing list. Their hope is that finding talent from other sources than the 'top tier bootcamps' will help to diversify their applicant pool.

Diversity as an unforeseen benefit to starting an apprenticeship program

As mentioned previously, the two main reasons companies invest in apprenticeship programs is either as an intentional way to diversify technical and engineering teams or a talent sourcing solution. However, many of the companies that invest in the programs purely as a talent solution found their apprenticeship cohorts to be organically more diverse than their traditional hires and noticed tangible benefits to having more diverse teams. More financially-advantaged people can afford to make a career switch without the financial support that apprenticeships provide. As a result, apprenticeships naturally attract more low-income applicants than entry level roles.

Limited curation of apprenticeship candidate pool

Among companies that use apprenticeship programs as a diversity driver, most do not impose any qualifying factors on the application pool. These companies still aim to reach underrepresented, underserved, or non-traditional candidates through their apprenticeship program. Instead of using qualifying factors, they make strategic decisions about where to advertise the program and which training providers to select as partners to ensure a diverse apprentice candidate pool.

Some companies did express a specific focus on a target group through a certain number of slots reserved for specific populations, but it was less common than widely defining the program to reach underrepresented, underserved, or non-traditional candidates.

Diversifying apprentice pipelines

In general, the interviews revealed that organic pipelines reliant on traditional job posting sites or open applications often yield a less diverse pool of candidates. Representation of low-income, and other underserved groups, is much stronger in pipelines that intentionally source candidates from non-profits and intermediaries that work with and have pre-existing connections to local underserved communities. On top of this general finding, several companies shared

specific tactics they have utilized to successfully reach and select candidates from nontraditional, underrepresented, and underserved communities. The advice to reach these groups includes:

- Be intentional with wording of job description, especially with the requirements section, as certain requirements or qualifications can deter applicants with non-traditional training. This is especially important if employers are using traditional job posting sites or recruiting pipelines.
- Build a blind selection process.
- Develop hiring practices from the ground up that remove bias, instead of adopting the hiring practices in place for traditional hires (e.g., whiteboarding bias against women).
- Do not allow referrals, as they lend themselves to bias.

Diversity Focus of Tech Apprenticeship Programs

Target Group	Number of Companies
As inclusive as possible, no limitations or qualifying factors on applicant pool	9
Underrepresented Minorities	3
Women	2
Youth	1
Previously Incarcerated	1
Veterans	1

Reaching local low-income, financially limited, youth applicant pools in the Bay Area:

One Bay Area company started an apprenticeship program with the intention of reaching applicants with a high school degree, potentially in low-wage jobs, who had the potential and appetite to learn tech skills. The inception of the program was driven by a VP at the company who volunteered at a local high school and saw potential among students without the financial means to pursue a four-year degree.

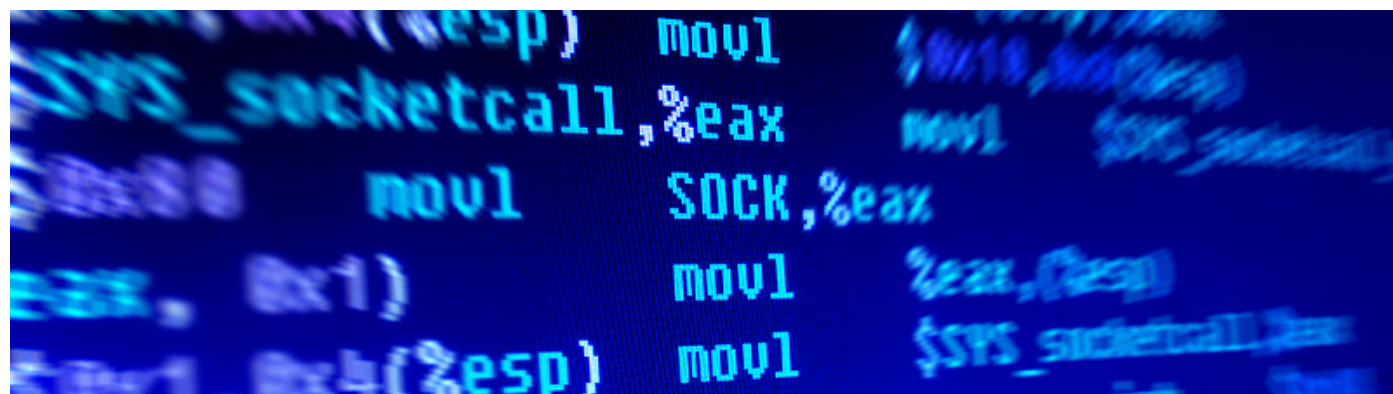
The program did not have specific diversity goals or quotas, but the selection process was built to be as inclusive as possible. No limitations were put on the applicant pool, the job description was written to not deter applicants with non-traditional backgrounds, and the interview process was built to address bias in typical engineering hiring methods.

A total of 500 applications were submitted for the first cohort of four apprentices, and one-third of those applicants were found to have high potential. Without limiting the application pool, the program naturally attracted a different demographic than imagined. Most applicants were career switchers, self-taught coders, or coding bootcamp graduates who were farther along in their learning journey in terms of the hard and soft

skills than a high school graduate. These applicants with some formal training or some professional experience rose to the top through the intentionally blind selection process. The apprentices that were selected thus needed less training and started performing at a high level quickly.

Based on the initial cohort, the company found that the pool of apprenticeship applicants was more highly qualified for a technical role than they anticipated. The absence of limitations on the applicant pool and blind selection process resulted in them not reaching the low-income youth talent that they intended to, but it was still a successful talent pipeline solution. The applicants were also still diverse by some definitions, with 50% being people of color and 87% being women.

While continuing to run the existing apprenticeship program as is, they are exploring a different model to serve people earlier on in their career paths. They hypothesize that reaching the local low-income youth that inspired the VP to pursue an apprenticeship program would require a program with more technical training prior to an apprenticeship placement on a technical team.



Outcomes & Successes

Apprentice job placement

Companies have different goals for what they define as a successful placement of an apprentice who has completed their program. Each company defines success uniquely, but there are similarities across companies:

Hire apprentices as full-time employees with benefits: Many of the companies hire apprentices as full-time employees at the onset of the program. These companies often cited that demonstrating a commitment to the apprentices early on through a full-time position had other tangential benefits on morale of the apprentices.

Converting apprentices to full-time employees: The majority of companies define a successful apprentice as someone who is hired into a full-time role within the company once their apprenticeship on-the-job training ends.

Host apprentices for on-the-job training, followed by assistance in finding full-time role internally or externally: Some companies with large programs lack the entry level open positions to hire all of the apprentices that participate in their programs. They still want to keep growing their programs and believe their investment in the programs builds tech talent industry wide. They often have partnerships with other companies where they place apprentices into full-time roles.

Established Program Outcomes (six companies)

- Retention rates ranging from 76% to 100% (all six answered question). Retention defined as apprentices being converted to full-time employees after their on-the-job apprenticeship concluded.
- Promotion rates of 50% and 54% (two of six reporting). No time period for promotion, this includes all previous apprentices who have been promoted since landing their first full-time position.

Early Stage Program Outcomes (seven companies)

- Four companies with first pilot/cohort underway.
- Three with a small number of apprentices hosted in an unstructured program.

Resourcing apprenticeship programs

Many of the employers had strategies on garnering internal resources devoted to an apprenticeship program. Companies that invested in apprenticeships from a diversity standpoint and from a talent solution standpoint both stressed the importance of locating funding outside of the corporate social responsibility arm of the company. They emphasized that making the business case for investing in an apprenticeship program results in funding that withstands organizational changes. Programs housed within the diversity and inclusion arm of the company found it helpful to identify champions on the business side of the organization to help secure financial support that comes from the core of the business that is less likely to be subject to discretionary cuts.

Another key factor in resourcing apprenticeships is getting buy-in from middle management, who make the decision to devote head count on their team toward apprentices. Ensuring managers are willing to support apprentices on their team is key to growing the number of roles that could be filled with apprentices. Intentionally aligning the core values of the company with the mission and vision of the apprenticeship program can facilitate gaining this essential support from leaders and managers.

Another large part of gaining support company-wide and industry-wide is an effort to shift the mindset that companies, leadership, and managers have about tech talent pipelines. Several companies mentioned that hiring managers within their organizations still think a four-year computer science degree is a key requirement for entry level hires. This shows that there is work to be done in convincing management in the tech sector as a whole that there is a deep pool of qualified candidates who do not have a traditional four-year degree. One strategy to attain management buy-in is to share the successes of apprentices early on to demonstrate the promise that these non-traditional candidates offer.

While not all companies have estimates for the cost of running their apprenticeship programs, those that did share ranged from \$22,000 per apprentice to \$75,000 per apprentice. The average of all the costs reported was \$44,800. Understanding the upfront costs of apprenticeship programs is another strategy for gaining financial buy in. For example, one company expressed that benchmarking the cost of their apprenticeship program to their university recruiting program was an effective strategy to build support for expanding apprenticeships.

Scaling apprenticeship pathways

Companies have different visions about how to expand apprenticeship programs, which can be grouped into the following strategies:

- **Internal Expansion:** Increase number of roles for apprentice by getting managers to devote head count to apprentices on their technical teams.
- **Industry Wide Adoption:** Grow apprenticeships in tech generally, with the vision of building a stronger and more diverse talent pool in the industry as a whole. These tended to be companies that have more established programs and may not be able to internally hire all of the apprentices that they host for on-the-job training, but want to keep supporting the same number of apprentices and getting them placed in roles at other companies in the tech industry.
- **Expand to Clients and Customers:** Place apprentices or assist in building apprenticeship programs at client businesses. Some companies have a specific software or product that requires customers to hire employees with expertise specific to the product (e.g., Salesforce and Amazon Web Services). Others see an opportunity to help their clients invest in diversity and expand their corporate philanthropy beyond their walls.

Company culture positively impacts success of apprenticeship programs

One of the companies interviewed had recently been acquired and compared notes with the team responsible for the apprenticeship program at their new parent company. They learned that the parent company had difficulty getting employees and managers to support the apprenticeship program. In contrast, at their own organization, every manager that hired an apprentice onto their team volunteered to dedicate head count to apprentices. The parent company had the opposite experience, and the employees running the apprenticeship program at

the company that was acquired hypothesize that the difference in manager buy-in is tied to the mission and values of the organizations. The company has active practices to ensure newly hired managers are aligned and bought into the mission of the organization. The vision of the apprenticeship program was intentionally aligned with the vision of the company, and thus resulted in managers already having values that embrace the inclusionary vision of the apprenticeship program.



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Training Providers, Educators, and Intermediaries

Findings from Training Provider & Educator Interviews

There are several different categories that these stakeholders who play formative roles in the apprenticeship process fall into. They range from organizations fully operating training curriculums, to groups that offer a range of career support with pathways to apprenticeships being one of their solutions they offer job seekers. This section catalogues these programs and highlights their diversity focus.

Bootcamps and immersion programs

Bootcamps are typically for-profit organizations that offer tech training curriculums at a cost. They partner with employers to provide training to apprentices, and the employer typically covers the cost of enrollment. Many of these programs offer career support to students and see apprenticeships that do not include formal training as a possible placement for their graduates.

Example 1: General Assembly is an educational provider focused on upskilling adults with tech skills. They have 27 locations globally. Their programming ranges from in-house large scale workplace learning programs for employees of a single company, to individual enrollment in bootcamps and courses. In addition to their hard skill tech training, General Assembly offers career

support to their graduates, and apprenticeships are one of the many avenues they encourage students to pursue. Among graduates, apprenticeships tend to be an attractive option due to the support that goes beyond the technical skills. Students are making fairly big leaps into their first tech role and apprenticeship programs have more security and managerial support than traditional full-time roles. However, there are only a handful of apprenticeships available, so they are not the most common form of employment that graduates find after completing a General Assembly training.

General Assembly also serves as the sole training partner for an apprenticeship program housed at a tech company. General Assembly sources the candidates for the program and collaborates with the company sponsoring the program to select apprentices who then attend General Assembly in a cohort, followed with a placement into an apprenticeship role at the company. This apprenticeship program is client driven and is supported financially by the company. In each cohort, General Assembly tailors the skills included in the program based on needs dictated by managers who have devoted an open role on their team to an apprentice. This model is unique and other companies have approached General Assembly about starting a similar program, though none have come to fruition with the same level of commitment to consistently hiring apprentices as their initial partnership.

- **General Assembly Diversity Focus:** None, but they offer scholarships for communities underrepresented in the tech sector and tuition discounts for students who have never made over \$50,000 in annual salary.

Non-profit training providers

These organizations have their own curriculum, typically provide training for free, and aim to serve a specific group of applicants. Some of them have been providing training for many years in different sectors, with a recent foray into tech as the demand for talent has grown. Others focus specifically on tech and were founded in response to the strength of the tech job market as a strategy to increase opportunities for targeted groups.

Example 2: JobTrain is a career training organization that focuses on low-income individuals, defined as people below the federal poverty line. Over half of their candidates are referrals from other people who have used their services, and the other half are recruited through outreach with local partners, rehousing groups, community colleges, churches, etc. They offer four career tracks, one of which is IT.

JobTrain has found that tech companies are hesitant to commit to hiring their candidates. The employers engage in other ways. For example, they come in to present as part of their job readiness programming, but often do not have consistent head count that they can devote to JobTrain IT hires. They have also found that many tech companies are also still looking for people with a four-year degree to fill IT roles, whereas the other industries they work with do not have this requirement.

- **JobTrain Diversity Focus:** Low-income individuals

Example 3: Genesis Works focuses on career success for low-income high school students through an eight-week training program followed by a paid internship placement at a company. The goal of their program is to expose students to a workplace and encourage them to seek higher education based on their experience being in a professional setting. Students who receive free or reduced lunches, would be first generation college attendees, or are living in untraditional housing are eligible for the program.

Genesis Works recruits from high schools where they have established relationships, because the students are required to leave school early to participate in their internship once placed. High school students are more familiar with the term internship versus apprenticeship, and Genesis Works expressed that many of their students would find an apprenticeship out of reach or feel underqualified for an apprenticeship. Genesis Works connects with employers through a range of tactics, but mostly through word of mouth between both departments within companies and company-to-company. The participating employers fill out a job description survey that is aggregated to inform the skills Genesis Works needs to train students on in the eight-week course.

- **Genesis Works Diversity Focus:** High school students in underserved communities

Example 4: NPower has a mission of creating pathways to digital careers for military veterans and young adults from underserved communities. They welcome anyone who qualifies for their program, but their grant dollars limit them to serving certain groups. Specifically, they have funding for young adults ages 18-25, and some funding looking to support women in tech.

In early 2019, NPower received approval from the State of California Department of Labor (CA DOL) for an IT generalist registered apprentice program. The participants in the Bay Area sign up for the pre-apprenticeship system that allows them to track hours toward the 2,000-hour on-the-job training requirement to complete the CA DOL IT generalist certification.

NPower's programming consists of hands-on instruction followed by a paid internship with an employer. The relationships with employers vary. Some companies consistently take on students on a yearly basis and sometimes hire the students if they are performing well and there is an opening. Other employers will come to NPower seeking a one-off direct placement into a permanent role. NPower has also noticed a recent acceleration of interest due to momentum in diversity and inclusion missions of companies.

- **NPower Diversity Focus:** Young adults from underserved communities and military veterans

Example 5: Dev Mission has a mission of getting more local low-income young adults ages 16-24 into the STEM field in the Bay Area. They have a six-month pre-apprenticeship program that they run in cohorts, covering both hard and soft skills necessary to pursue a career in STEM. Once students graduate from the six-month program, next steps are determined on a case-by-case basis. This process helps students take charge of their career, supporting them to pursue more education, an apprenticeship, or direct career placement depending on their interests, skill level, etc.

Dev Mission is working on building out its apprenticeship pipeline by working more closely with the City of San Francisco and by solidifying relationships with employers who are investing in apprenticeship programs. Since they started in 2017, 50 people have been placed in tech jobs and 60 more are in career pathways to a full-time role or pursuing more education. To ensure they are reaching target demographics, Dev Mission recruits students from within affordable housing communities at youth events, distributing flyers and encouraging students to apply on its website.

■ **Dev Mission Diversity Focus:** Diverse young adults

Example 6: JVS has been in workforce development for decades, and their approach to workforce development has evolved over the years. Prior to the 2008 recession, JVS focused mainly on network and resume building and interview and professional skills development. After the financial crisis, the organization began to lean into skills building and career pathway strategies. During this time, they started to build out a tech training pathway, which they launched through a Department of Labor (DOL) Ready to Work grant focused on creating registered apprenticeships in tech for people who had been out of work for six months or longer. The goal was to focus on long-term unemployment and help mid-career professionals who had lost their jobs during the recession re-enter the workforce.

JVS decided to focus this program on Salesforce administration, because they found it to be an in-demand skillset based on market research. They partnered with Salesforce and other tech companies that use the product to create an advisory group to match the industry demanded skills with the curriculum.

JVS has found that while their Salesforce Administrator program has been successful for some of their job seekers, in comparison to pathways they offer in other sectors, job placement in tech can be more difficult. JVS cited a few reasons for the difficulties in job placements in tech. First, they have found many people are lining up for jobs in the tech community across all levels of employment, thus the decision to hire from a workforce training program serving diverse talent becomes a values-based decision for a tech company. Whereas in other sectors they work within, there is a business-driven incentive to fill their entry level roles through any program or school graduating qualified candidates.

Second, JVS mentioned that building a large number of placement opportunities for their job seekers in tech is a bigger lift due to the fact that most employers are only hiring one or two Salesforce Administrators. In other sectors, such as health care, a single employer is often hiring many people for the same entry level role, making the development of one employer relationship much more fruitful. Lastly, JVS cited that tech companies do not find their forays into hosting apprentices to be scalable unless they have the resources to devote a full-time employee to run the program operations, and few companies have the resources to commit at that level.

JVS also recently became the tech sector coordinator for San Francisco, which means they are funded by the City of San Francisco to raise awareness among employers about opportunities to hire local talent. JVS also convenes and connects partners who are all funded through the city's TechSF initiative, as well as employers identified as being interested in apprenticeships and local talent development.

■ **JVS Diversity Focus:** Through DOL grant, participants had to fall below a certain income level. Through TechSF, local talent focus.

Talent Intermediaries

Organizations that provide a platform for employers, students, and educators to connect are classified as talent intermediaries within this research. These intermediaries all have different models; at a high level, they help verify applicant skills to simplify the process for employers in finding apprenticeship candidates.

Example 7: Upwardly Global helps underemployed or unemployed immigrants and refugees find jobs that fit their skill sets and professional backgrounds. They have many avenues to help their job seekers find positions, one of which is as a registered pre-apprenticeship provider for the City of San Francisco. Upwardly Global provides soft skills training through their own programming and then funnels pre-apprenticeship candidates into the city database, which qualifies them for a range of opportunities posted through the city—some of which are apprenticeships and some of which are other forms of employment. Job seekers are excited about the opportunity to get their foot in the door with an employer, but only one candidate has landed in an apprenticeship through the city database.

Upwardly Global cited a few reasons for their limited success with apprenticeships. First, most of their job seekers are experienced professionals and are thus not the typical target of an apprenticeship, which tends to focus on early career professionals. Additionally, Upwardly Global has a niche pool of applicants that qualify for their programming, and diversity and inclusion departments are hesitant to narrowly define their diversity focus on immigrants and refugees. Lastly, Upwardly Global does not focus on one specific skill or industry, which makes it difficult for them to consistently provide candidates with similar skills, as an apprenticeship program needs.

■ **Upwardly Global Diversity Focus:** Skilled immigrants and refugees

Example 8: Apprenti started in 2015 as a consortium of employers through the Washington Technology Industry Association Workforce Institute. Employers gave input on how the program needed to be structured to succeed as a viable solution to tech talent woes. Under the Apprenti model that has since expanded to California, the employer dictates the training required for the open roles they want to fill with apprentices. Apprenti then identifies a training agent that offers the best curriculum to fit skills dictated by the employers. On the other side, applicants complete an assessment that tests for competency, social skills, and soft skills, but does not assess technical skills at all. Students can also test out of certain learning areas if they already have some of the necessary skills dictated by the employers.

A match is made with an employer prior to the students completing any training, and the placement is contingent on them completing or testing out of the relevant learning areas for the role. All apprenticeship roles are registered with either the U.S. DOL or the State of California. Apprenti is also the sector lead for IT apprenticeships with the U.S. DOL. They are committed to registering their program and simplifying the process for companies to hire registered apprentices. This accomplishes standardization of base level skills that tech apprentices all share, making companies more comfortable with hiring apprentices.

Apprenti now operates across 10 states and has found unique features about their programming in the Bay Area. Bay Area companies are harder to convince that they should take a different approach to talent acquisition. Additionally, non-tech companies with tech needs adapt to alternative talent pipelines faster than tech companies. Tech, especially big tech companies, has a disconnect between ambitious diversity goals set by leadership and middle management opinion on qualifications (e.g., four-year degree requirement). This results in goals being difficult to meet due to talent constraints and a lack of willingness to consider non-traditional candidates. Due to the concentration of tech in Bay Area, these last two points disproportionately impact Apprenti's success in the region.

Apprenti takes a holistic approach to recruiting applicants in each of their locations. Community partners in the Bay Area include local workforce development organizations, non-profits serving diverse populations, community colleges, etc. Apprenti provides community partner training that teaches these partners how they can encourage local talent to apply to the Apprenti program. Local relationships are key to the success and depth of their applicant pool.

Apprenti does not have any qualifying factors for applicants in order to keep the process as unbiased as possible. Apprenti has also increasingly heard from companies that they are equally focusing on diversity as inclusion, and are similarly hesitant to add any qualifying factors to apprenticeship applicant pools.

■ **Apprenti Diversity Focus:** Underrepresented groups such as minorities, women, and veterans

Community Colleges

Example 9: The Bay Area Community College Consortium (BACCC) works with 28 Bay Area community colleges to facilitate projects that have a regional impact. One of the areas the consortium is focused on is information technology and digital media. In this area, BACCC has several curriculums they are working to implement across the community colleges within their network. The newest undertaking is a cloud computing curriculum designed in partnership with AWS Educate—a global workforce training program that Amazon has invested in—to offer an industry-designed certification in cloud computing software for community college students in the Bay Area. This program is being piloted at Foothill College and is modeled after the successful partnership AWS Educate spearheaded with community colleges in Southern California.

AWS Educate provides the community colleges with support in several ways. They train community college staff on how to teach AWS curriculum, give students and teachers access to their cloud computing facilities, share learning labs and modules, and provide an ecosystem for students who have completed the training to connect with companies that are seeking talent with cloud computing competency. However, the BACCC noted that this curriculum is designed for people with some level of professional experience, and they have found they have to supplement the provided curriculum with workplace training opportunities because many of the students interested in the program do not have this assumed level of professional experience. These training opportunities range from real world problem solving cases designed by companies to full apprenticeships.

BACCC has cited that one barrier to growing the program is the mismatch between supply of students completing the course and demand for entry level candidates who would require a degree of on-the-job training. BACCC mentioned that a mechanism for better matching the supply and demand for tech apprenticeships through communication between the community colleges and employers, similar to how trade unions operate, could help alleviate this mismatch.

- **BACCC Diversity Focus:** None, but enrollment tends to be people reskilling and upskilling.

Public Agencies

Many public agencies in the region have been making investments in apprenticeships to facilitate the development of a larger tech workforce or to help the underemployed and unemployed.

Example 10: SLO Partners is an organization formed under the San Luis Obispo County Office of Education. In order to find a disruptive solution to the lack of alignment between current tech education and business needs, SLO Partners shapes their programming and curriculum based on in-depth work with employers seeking tech talent. The data-driven understanding of business needs that employers are facing is used as an input in building an attractive “product” to offer employers. SLO Partners is now in their third year of working with apprenticeships and have placed 94 people in jobs, 85 of which were placed in registered apprenticeships. Their goal is to attract underemployed and unemployed individuals.

- **SLO Partners Diversity Focus:** None, scholarships offered for high school students and women

Example 11: TechSF is an initiative of the San Francisco Office of Economic and Workforce Development, which has a mission of providing education, training, and employment assistance to San Francisco residents who are interested in finding employment in the San Francisco tech sector. TechSF achieves this by building connections and relationships between community leaders, workforce training organizations, and employers who have a shared interest in developing pathways for local talent into the tech sector.

TechSF has several different programs to achieve this goal, one of which is specially focused on apprenticeships. Their Apprenticeship Accelerator Training Partners connects job seekers with employers who host apprenticeship programs and offers a certificate, recognizing their completion of on-the-job training. On top of this apprenticeship program, TechSF acts as a connector between many players involved in the apprenticeship space in the tech sector in San Francisco through events and convenings.

- **TechSF Diversity Focus:** Local talent



3

Recommendations to increase access to tech apprenticeships for low-income workers and underrepresented communities

The interviews conducted with employers, non-profits, and public sector partners reveal that there is interest from employers to grow tech apprenticeships, but that many employers face roadblocks in expanding or starting apprenticeship programs. The following recommendations provide a framework for how tech apprenticeships can grow to serve low-income and underserved populations in the Bay Area through investment, employer collaboration, and communication between employers and training providers.

1. Expand connections between training partners that target low-income, underrepresented populations and tech employers with apprenticeship programs.

Background: While companies are often hesitant to commit to a partnership with a single provider and prefer to maintain a wide definition of diversity, stronger informal connections with training providers that target underserved communities can help expand apprenticeships to serve these communities.

Strategy: Facilitate relationships between employers and trusted training providers to create an avenue by which employers can source predictably high-quality apprentice candidates from underserved communities.

2. Facilitate partnership between community colleges and non-profit training providers to match rigor of instruction with employer talent needs.

Background: Many candidates for apprenticeships and entry level engineering roles have skills that do not perfectly align with employers' technical skills needs. For example, many bootcamps currently teach full stack web development while there are not necessarily a large number of jobs in that category.

Strategy: Build a feedback system that allows for employers to inform training partners and educators in the community with up-to-date technical workforce needs, with a goal of creating dynamic and adaptable curriculum to match evolving employer needs.

3. Identify a source of financial support for underserved populations, allowing individuals seeking to make a career switch into tech the time to develop soft and hard skills to become competitive apprenticeship applicants.

Background: Apprenticeships can be financially

justifiable for companies in the long term but the return on investment can be long. Apprentice applicant pools also tend to be large and include people that are at different places in their career trajectories. The most highly qualified applicants are likely to start performing at a high level quickly at a lower cost to employers. As such, candidates with both professional experience and technical knowledge are often the most attractive candidates. Low-income individuals often lack the financial flexibility to take time off from work to develop these desirable prerequisite skills.

Solution: Provide financial support to low-income individuals so they have the resources to develop base hard and soft skills prior to applying to apprenticeships to increase their competitiveness as candidates.

4. Determine the aspects and costs of apprenticeship programs that can be shared or made more efficient through employer collaboration.

Background: One key reason apprenticeship programs are unable to scale at companies is because they lack the resources to hire a full-time employee to manage the administrative aspects of the program.

Strategy: Identify places that collaborative investments across multiple employers would be realistic and financially beneficial. Aspects that could be viable for collaboration as mentioned by employers include: sharing a family of resources on best practices, pooling resources for candidate attraction, sharing information on successful partnerships across markets and cities, and manager training for leaders supporting apprentices.

5. Increase access to on-the-job tech training by expanding access to state funding and tax credits for apprenticeships in tech.

Background: Bootcamp graduates, career switchers, and participants in non-profit training programs are all hungry for opportunities to get their first on-the-job experience in the field after they have completed a training program. As such, companies with apprenticeships are not limited by size of the applicant pool at all; they often get over 1,000 applications for

a single role or cohort. Training providers on the other hand look for as many relationships with employers as possible in order to offer their participants access to on-the-job training—another nod to the value of apprenticeships. As a result, the demand for on-the-job training far outweighs the availability of opportunities.

Strategy: Create a coalition of companies to support the institution of a new category of California Department of Labor-recognized apprenticeships that eases the process of getting state registration. With state recognition of tech apprenticeship, programs could be created that provide financial assistance or tax credits lesser than that associated with traditional registered apprenticeships, while still offering some monetary support. Many of the tech employers interviewed find the current registration process to be cumbersome. Alleviating some of the red tape currently in place to access government support for on-the-job training programs would be transformational for companies seeking to grow apprenticeship programs.

6. Increase the appetite and redefine base level qualifications for entry level technical roles.

Background: Many people in the tech space still hold traditional views of talent recruitment and entry level qualifications. When employee attrition occurs, companies often default to hiring a replacement at the same level as the employee who left. In terms of entry level qualifications, many recruiters and hiring managers still require a traditional four-year degree. Shifting these two views has the potential to positively impact the expansion of apprenticeships to more candidates.

Strategy: Create a forum for employer-to-employer communication to discuss shifting the status quo on these two hiring policies. Redefining entry level qualifications to include diverse educational backgrounds outside of a four-year degree has the potential to popularize non-traditional pipelines such as on-the-job training and apprenticeships. Replacing one higher level software engineer with several entry level software engineers could expand the number of entry level roles and make room for more non-traditional hires in tech.

4

Conclusion

The six recommendations presented in this report serve as a guide for not just growing the number of apprenticeships in the Bay Area, but also to increase the access to these programs for low-income individuals from underserved communities. Acting on these recommendations now, with job losses in low-wage occupations likely to persist even after the COVID-19 pandemic subsides, will help bolster access to sustainable high-wage job opportunities during the economic recovery from this crisis.

The number of people and organizations that participated in interviews that informed this report, from employers and non-profits to community colleges and public agencies, shows the level of interest and commitment that exists to the vision of widespread adoption of apprenticeships in the tech sector. Continued engagement and active participation across all of the groups that played a role in the creation of this report is key to the success of that vision.



Endnotes

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