

# Why Tech Companies Should Offer Apprenticeships

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A practical guide to understanding the value of apprenticeships, their structure and how they fill talent pipelines

Produced by:

**Consumer  
Technology  
Association™**



# Contents

<b>Welcome Letter</b>	3
From Jennifer Taylor, VP, Industry Affairs	
<hr/>	
<b>Executive Summary</b>	5
<hr/>	
<b>I. What are Apprenticeships?</b>	6
<i>Company Profile: Postmates</i>	14
<hr/>	
<b>II. Why Apprenticeships Matter</b>	18
<i>Company Profile: Amazon Web Services</i>	23
<i>Company Profile: Adobe</i>	25
<i>Company Profile: Bosch</i>	27
<hr/>	
<b>III. Key Stakeholders in the Apprenticeship Ecosystem</b>	29
<i>Company Profile: Northern Virginia Community College</i>	32
<hr/>	
<b>IV. Models of Apprenticeship</b>	33
<i>Company Profile: IBM</i>	34
<i>Company Profile: Phone2Action</i>	36
<i>Company Profile: Pandora</i>	39
<hr/>	
<b>V. How to Build an Apprenticeship Program</b>	43
<hr/>	
<b>VI. Conclusion</b>	50
<hr/>	
<b>VII. Glossary</b>	51
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# Welcome Letter

Dear Tech Industry Leaders,

There's an exciting trend happening in the United States' workforce. Tech employers are beginning to see the value of apprenticeships and use them as a new way to source talent and fill the growing number of jobs unleashed by new technologies.

The nation is experiencing an unprecedented skills gap, without enough qualified workers to fill millions of open jobs in roles such as software engineer, data analyst, cybersecurity, graphic designer and more. There is a concrete, demonstrable need for tech workers as the industry fuels many of the *eight million* new jobs expected to join the U.S. economy by 2023.<sup>1</sup> In



response, tech companies have turned to alternative talent pipeline solutions, such as apprenticeship, to fill jobs.

The good news is that over 500,000 Americans are in apprenticeships, simultaneously earning an income while learning in-demand skills on the job. This number is growing as more employers register new, apprenticeable occupations that expand beyond traditional blue-collar trades into “new collar” jobs. A new collar job is neither white-collar nor blue-collar, but rather falls in the middle. New collar careers do not require a traditional bachelor's degree and can be accessed if employers make apprenticeships available to individuals who demonstrate some relevant competencies and skills, such as intellectual curiosity and a willingness to learn and grow on the job. Most tech-related jobs are new collar jobs.

The Consumer Technology Association (CTA)<sup>®</sup> recognizes the value of preparing and maintaining a highly skilled 21st-century workforce. The tech sector accounts for 12% of U.S. GDP and is the fastest-growing part of the American economy. For our industry to meet its full potential, additional employment pathways must be adopted.

CTA's member companies are investing in upskilling workers to perform jobs in high demand and creating new pathways to attract talented candidates who might never have considered working in the tech industry. But we all recognize there is more work to be done.

In January 2019, CTA and IBM created the CTA Apprenticeship Coalition, a collaborative effort by more than 40 CTA member companies committed to creating and scaling apprenticeships for new collar jobs nationwide and to filling the surging number of positions in fast-growing fields with talent from all backgrounds.

<sup>1</sup> <https://www.foxbusiness.com/economy/tech-industry-may-drive-creation-of-8-million-jobs-by-2023>

Members of the coalition draw upon IBM's successful apprenticeship — launched in 2017 — as a best-in-class model to help their companies develop, launch and scale their own apprenticeships and to build a more talented, diverse and adaptable workforce.

The goal of this white paper is to serve as a guide for tech industry leaders to understand the value of apprenticeships for new collar roles, address their skills gap and make informed decisions about how to add apprenticeship into a talent pipeline strategy.

Apprenticeships are one of the oldest education models in the world. Before the Industrial Revolution, everyone from blacksmiths to painters learned his or her trade by working alongside a skilled master. To prepare for the future, we must learn from the past, adapting this pre-modern model to today's workforce.

I am so proud of what CTA and our member companies have accomplished thus far in growing the number of apprenticeships for new collar roles. I hope this white paper will inspire you and your colleagues to build an apprenticeship from the ground up or expand an existing program at your company.

Together, coalition members remain committed to building a more vibrant and diverse workforce that drives innovation and meets the workforce challenges of today and tomorrow.

Sincerely,

A handwritten signature in black ink that reads "Jennifer Taylor". The signature is fluid and cursive, with the first name "Jennifer" being larger and more prominent than the last name "Taylor".

Jennifer Taylor  
VP, Industry Affairs  
Consumer Technology Association

# Executive Summary

The technology industry has become the engine of American growth, generating more than 1.9 million jobs between 2010 and 2018.<sup>2</sup> Today, the sector accounts for nearly 12% of U.S. GDP.

Increasingly, all companies are tech companies — meaning that the future of the American workforce is a high-tech one. But that success has also created a growing skills gap: In September 2019, the Bureau of Labor Statistics reported that about 5.8 million Americans were unemployed,<sup>3</sup> even as seven million jobs remained unfilled.<sup>4</sup> Many of these jobs require mid- to high-level skill sets.

These figures are indicative of a common problem: Companies, especially in the tech sector, struggle to grow as quickly as they could if workers' skills matched those employers need. The result is that businesses are leaving behind talented individuals who lack the skills to access high-quality, high-paying jobs.

To meet the challenge, some of the most cutting-edge companies in the country are turning to an old solution: apprenticeship. For centuries, apprenticeships have enabled employers to develop the employee skills they seek while giving

individuals valuable, paid work experience. In 2018, about 585,000 Americans participated in state- and federal-registered apprenticeships, a number that has grown every year since 2011.

The CTA Apprenticeship Coalition is encouraging this trend by helping tech companies incorporate apprenticeships into their talent pipeline strategies. This white paper will help employers understand why and how to get started.

In Section I, we present the history and current state of apprenticeships, including recent government and private sector efforts to bring apprenticeships into the 21st century. In Section II, we demonstrate the benefits of these programs for employers and individuals, and for building a diverse, productive and thriving U.S. workforce.

In Section III, we review the pieces that make up the apprenticeship ecosystem, including how third parties can help employers sponsor and build apprenticeships. In Sections IV and V, we present a concrete guide to building an apprenticeship program, walking employers through the various steps and presenting recommendations for how to develop organizational buy-in, establish standards, obtain funding and create value for apprentices.

<sup>2</sup> [https://www.cyberstates.org/pdf/CompTIA\\_Cyberstates\\_2019.pdf](https://www.cyberstates.org/pdf/CompTIA_Cyberstates_2019.pdf)

<sup>3</sup> <https://www.bls.gov/news.release/empsit.a.htm>

<sup>4</sup> <https://www.bls.gov/news.release/jolts.nr0.htm>

# I. What are Apprenticeships?

## A Brief History of Apprenticeships

For centuries, apprenticeships have played a role in training workers for blue-collar jobs.<sup>5</sup> In recent years, however, tech companies have discovered the value of the apprenticeship model. As a result, they are incorporating a mix of classroom learning, mentorship and on-the-job training to help fill their talent pipelines and hire individuals into in-demand roles. Apprenticeships enable tech companies to tap into new sources of labor, create jobs for people who might never have had access to them and build more diverse and inclusive workforces.

An **apprenticeship** is “an industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience, classroom instruction, and a portable, industry-recognized credential.”<sup>6</sup> In short, it is an earn-while-you-learn training program.

Apprenticeships became a codified feature of the U.S. labor landscape in 1937, when Congress, responding to the overwhelming unemployment of the Great Depression, passed the **National Apprenticeship Act** (NAA).<sup>7</sup>

The NAA established a national committee to set safety and welfare standards for apprenticeships. By the 1940s, an estimated 4,000 apprentices

were taking part in more than 6,200 registered apprenticeships.<sup>8</sup> In the years immediately following the passage of the NAA, apprenticeships were largely limited to trades and manufacturing industries. After World War II, the range of industries with apprenticeship programs expanded to include firefighting, emergency medical service and other health and safety work.<sup>9</sup>

Over the next 60 years, apprenticeships remained associated primarily with trade industries. However, in the years following the 2008 global financial crisis, tech companies have found themselves increasingly unable to staff positions with qualified hires. In 2015, for example, approximately 545,000 information technology jobs in the U.S. went unfilled.<sup>10</sup> As a result, since the end of the financial crisis, both businesses and governments have begun to create new apprenticeship opportunities to help fill the growing number of new, in-demand, high-skilled occupations.

More than 75 years after passing the NAA, government leaders once again adapted the nation's apprenticeship ecosystem to meet modern demands. In 2014, Congress passed the **Workforce Innovation and Opportunity Act** (WIOA), replacing a previous law to update the government's workforce development policy.

<sup>5</sup> <https://eh.net/encyclopedia/apprenticeship-in-the-united-states/>

<sup>6</sup> <https://www.apprenticeship.gov/faqs>

<sup>7</sup> <https://www.doleta.gov/OA/history.cfm>

<sup>8</sup> Ibid

<sup>9</sup> Ibid

<sup>10</sup> <https://obamawhitehouse.archives.gov/issues/technology/techhire>

## CTA SIGNS THE PLEDGE TO AMERICA'S WORKERS

On May 1, 2019, CTA and its member companies signed the Pledge to America's Workers during a White House meeting with administration officials — a commitment to expand programs that educate, train and reskill U.S. workers and a call upon employers to join this initiative to create more jobs.

To date, CTA and 59 of its member companies have signed the Pledge to America's Workers, promising to add more than two million new U.S. worker training opportunities for their employees, either through CTA or independently. CTA member pledges currently represent more than 14% of total pledges.

The new law presented apprenticeships as a way to meet the growing demand for talented labor across the country and adapt worker training to a changing economy. The WIOA puts apprenticeship representatives on state and local workforce boards and places registered apprenticeships on **Eligible Training Provider Lists** so employers can receive federal workforce funding. The law also raised reimbursement rates for on-the-job training above those established by the Workforce Investment Act of 1998.

Since 2015, Congress and the Department of Labor have invested a combined total of \$265 million toward expanding apprenticeships to help develop the workforce of tomorrow. Although an employer cannot use WIOA funds to pay apprentices' wages, it can use them to support related technical instruction and mentorship.<sup>11</sup> An employer can access WIOA funds once it has registered its program and been listed on Eligible Training Provider Lists within its state.<sup>12</sup>

In July 2018, President Trump signed an executive order<sup>13</sup> establishing a National Council for the American Worker. The council is tasked with recommending a national strategy to promote workforce development and close the skills gap through partnerships between private industry, educational institutions and public agencies, expanding the availability of apprenticeships and other work-based learning opportunities.

Spurred by the July 2018 order, more than 300 businesses and trade unions — including powerhouses such as the National Association of Manufacturers, Amazon and Walmart — signed the Trump administration's Pledge to America's Workers. As of October 2019, 367 companies have pledged to create more than 14 million apprenticeships, retraining and continuing education opportunities over five years.<sup>14</sup>

<sup>11</sup> <https://www.dol.gov/apprenticeship/toolkit/docs/Desk-Aid-Use-of-Funds.pdf>

<sup>12</sup> [https://wdr.doleta.gov/directives/attach/TEGL/TEGL\\_13-16\\_acc.pdf](https://wdr.doleta.gov/directives/attach/TEGL/TEGL_13-16_acc.pdf)

<sup>13</sup> <https://www.whitehouse.gov/presidential-actions/executive-order-establishing-presidents-national-council-american-worker/>

<sup>14</sup> <https://www.whitehouse.gov/pledge-to-americas-workers/>

## The Nation's Skills Gap

These public and private efforts to equip workers with in-demand skills could hardly arrive at a more opportune time for U.S. workers and employers alike. In September 2019, although the U.S. unemployment rate held steady at an unprecedented 50-year low of 3.5%,<sup>15</sup> almost six million Americans remained unemployed<sup>16</sup> and seven million jobs went unfilled.<sup>17</sup>

The U.S. economy is expected to add more than eight million jobs from 2018 to 2023, fueled largely by the tech industry.<sup>18</sup> As new technologies become a crucial part of more companies' day-to-day functions, many of those jobs will require employees to have advanced technical skills. That fact holds equally true for businesses in and outside traditional tech sectors. According to an analysis by Deloitte, the manufacturing sector alone could face as many as two million unfilled jobs between 2018 and 2028 due to a lack of qualified workers.<sup>19</sup> Already, businesses in areas from finance to manufacturing, education and health services report difficulty filling open positions.<sup>20</sup>

Among the factors contributing to the skills gap are advances in software development, artificial intelligence, machine learning and robotics. Those innovations have created thousands of jobs that did not previously exist. Many of these new roles demand a specialized set of technical and soft skills without requiring four-year degrees.<sup>21</sup> Instead, they fall into an emerging category of roles known as **new collar** jobs.

New collar workers — a term coined by Ginni Rometty, CEO, IBM — can thrive in jobs requiring specific technical skills, but they may have acquired some of their abilities at community colleges, bootcamp programs or may be entirely self-taught. New collar workers may also include career changers with backgrounds in unrelated industries who learn relevant skills to move into in-demand roles. These workers can fill a range of positions in industries as diverse as tech, health care and hospitality.<sup>22</sup>

From 2010 to 2018, the tech industry alone added 1.9 million jobs to the U.S. economy,<sup>23</sup>

<sup>15</sup> <https://www.bls.gov/news.release/empsit.a.htm>

<sup>16</sup> Ibid

<sup>17</sup> <https://www.bls.gov/news.release/jolts.nr0.htm>

<sup>18</sup> <https://www.foxbusiness.com/economy/tech-industry-may-drive-creation-of-8-million-jobs-by-2023>

<sup>19</sup> <https://www2.deloitte.com/us/en/pages/manufacturing/articles/future-of-manufacturing-skills-gap-study.html>

<sup>20</sup> <https://www.hiringlab.org/2019/07/08/hard-to-fill-industries/>

<sup>21</sup> <https://www.ibm.com/services/learning/sites.wss/zz-en?pageType=page&c=N807151X80720G91>

<sup>22</sup> <https://www.virtualvocations.com/blog/telecommuting-job-search-help/top-10-remote-new-collar-jobs/>

<sup>23</sup> [https://www.cyberstates.org/pdf/CompTIA\\_Cyberstates\\_2019.pdf](https://www.cyberstates.org/pdf/CompTIA_Cyberstates_2019.pdf)

but worker training efforts have yet to produce enough qualified applicants to meet future hiring demands. According to Code.org, there are more than 500,000 open computing jobs nationwide, while fewer than 64,000 students in the U.S. graduate with computer science degrees each year.<sup>24</sup> Universities are unprepared to fill that gap, and the focus on four-year degrees misses a crucial fact: Not all the open computing jobs require them.

Nevertheless, a growing number of employers in all industries need workers who have coding, information technology and other technical skills. Between 2012 and 2017, agricultural businesses saw a nearly 90% increase in the share of tech workers in the industry. Companies in the banking sector saw a nearly 43% increase over the same time period.<sup>25</sup> The natural gas, utilities and publishing industries all reported similar increases in the share of tech positions among their workforces. The most common tech positions range from software engineer and system administrator to web developer and network analyst.<sup>26</sup>

The employers' struggle to find qualified employees will only grow more difficult unless our country makes changes in how companies train and hire workers. Apprenticeships must be part of that solution.

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According to Code.org, there are more than 500,000 open computing jobs nationwide, while fewer than 64,000 students in the U.S. graduate with computer science degrees each year.

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<sup>24</sup> <https://code.org/promote>

<sup>25</sup> <https://www.hiringlab.org/2019/07/18/tech-jobs-arent-just-in-tech/>

<sup>26</sup> Ibid

# The Apprenticeship Resurgence in the U.S.

In his 2014 State of the Union address, President Obama called for increased access to apprenticeships and other job training programs. The following year, the U.S. Department of Labor (DOL) awarded \$175 million to public-private partnerships designed to create 34,000 apprenticeships in fields ranging from public transit to health care data management.<sup>27</sup>

In 2016, the DOL invested \$90 million in state efforts to widen the pool of apprenticeships and spur growth in high-tech programs.<sup>28</sup> It also awarded \$50 million in grants to expand national apprenticeship programs further.<sup>29</sup>

Support for apprenticeships continued during the next administration. In June 2017, President Trump signed an executive order<sup>30</sup> to expand apprenticeship and workforce development programs. The order set aside funds to promote apprenticeships and established a Task Force on Apprenticeship Expansion<sup>31</sup> within the DOL. Comprised of representatives from industry, trade associations, labor unions, educational institutions and public agencies, the task force was charged with developing a new, scalable model for promoting apprenticeships.

In May 2018, the task force issued its final report.<sup>32</sup> Among other solutions, it recommended helping businesses and policymakers identify areas where the skills gap is most severe. The task force also advised scaling the adoption of apprenticeships as a hiring solution and advancing **Industry-Recognized Apprenticeship Programs** (IRAPs), a business-driven, rather than government-led, approach to apprenticeships. IRAPs, which are still in the DOL's rulemaking phase at the time of publishing, would allow the DOL to extend authority to industry-led groups to develop, oversee, manage and approve apprenticeship programs in occupations within their industries.

With the support of the last two presidential administrations, the number of active apprentices in the U.S. has grown rapidly. In 2011, nearly 358,000 people participated in apprenticeships registered at either the state or federal level. In 2017, the number was almost 534,000 — an increase of nearly 50% in only six years. In 2018, the number of active apprentices increased to roughly 585,000 — a gain of almost 10% in one year.<sup>33</sup>

The number of programs available to apprentices has risen as well. In 2018, there were 3,229 new state- and federal-registered apprenticeships nationwide, up by nearly 1,000 from 2017.<sup>34</sup>

<sup>27</sup> <https://www.marketwatch.com/story/obama-administration-to-award-175-million-in-grants-to-create-new-apprenticeships-2015-09-09>

<sup>28</sup> <https://obamawhitehouse.archives.gov/the-press-office/2016/04/21/fact-sheet-investing-90-million-through-apprenticeshipusa-expand-proven>

<sup>29</sup> <https://obamawhitehouse.archives.gov/blog/2016/10/21/apprenticeshipusa-upskilling-america>

<sup>30</sup> <https://www.whitehouse.gov/presidential-actions/3245/>

<sup>31</sup> <https://www.dol.gov/apprenticeship/task-force.htm>

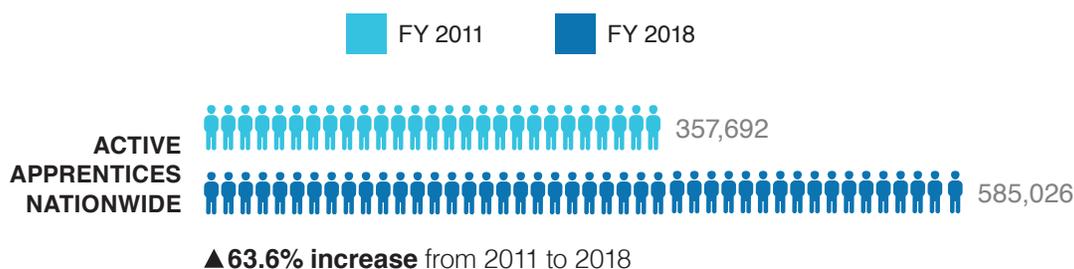
<sup>32</sup> <https://www.dol.gov/apprenticeship/docs/task-force-apprenticeship-expansion-report.pdf>

<sup>33</sup> [https://doleta.gov/oa/data\\_statistics.cfm](https://doleta.gov/oa/data_statistics.cfm)

<sup>34</sup> Ibid

Apprenticeships help bridge the gap between the skills employers need and the skills job seekers have. New collar roles are particularly well suited to apprenticeships, as the programs take less time to complete than four-year degrees, require no financial investment from participants and make it easier for employers to identify and train employees for specific job requirements.

### Apprenticeships by the Numbers



#### NEWLY REGISTERED APPRENTICESHIP PROGRAMS



▲ **129.2% increase** from 2011 to 2018

#### STATES WITH THE MOST ACTIVE APPRENTICES, FY18

<b>California</b>	<b>89,949</b>
South Carolina	20,763
Michigan	20,576
Ohio	19,081
New York	18,337
Pennsylvania	17,948
Texas	17,767
Indiana	16,973
Washington	16,622
Illinois	15,905

## Types of Apprenticeships

Apprenticeships fall into one of three categories:

1. **Federal registered apprenticeships**,
2. **State registered apprenticeships** and
3. **Unregistered apprenticeships**.

**Federal registered programs** are approved by the DOL, which oversees program credentials and occupational standards, apprenticeship safety, certification and other program elements.

In 25 states — including Virginia and Washington — and the District of Columbia, the DOL authorizes a **State Apprenticeship Agency** (SAA) to carry out some of the operational requirements of administering apprenticeships. A **state registered program** is one that has been submitted to and approved by an SAA. These apprenticeships meet a set of state-specific standards and can operate only in the states in which they are registered.

SAA's process applications for new, in-state apprenticeships, issue credentials, oversee apprentice safety and carry out other duties on behalf of the DOL. A state may choose to operate an SAA for several reasons, among them the ability to set its own apprenticeship standards, distinct from those approved by the DOL (see Section III). Employers operating an apprenticeship program in a state with an SAA will register their program with the state, rather than at the federal level (see Section V).

By registering an apprenticeship with the DOL or an SAA, an employer qualifies to apply for government grants to offset some of the apprenticeship administration expenses, as long as the program meets certain standards.

**Unregistered apprenticeships** are programs that provide the same earn-while-you-learn benefits as other apprenticeships, but are not registered at either the federal or state level. As a result, they are not overseen by the DOL or an SAA and do not have to meet the same quality standards as registered programs. For example, an unregistered program does not need to include a minimum number of hours of related technical instruction or on-the-job training.

An IRAP<sup>35</sup> is a new type of apprenticeship model under review by the DOL. As proposed, a Standards Recognition Entity (SRE) authorized by the DOL would approve industry-specific apprenticeship programs, with standards that may differ from federal or state-registered apprenticeships. SREs could range from a trade group or industry association to an educational institution or nonprofit.<sup>36</sup> The model is intended to streamline creating new apprenticeship initiatives by providing industries flexibility to create programs that meet sector-specific demands.<sup>37</sup>

<sup>35</sup> <https://www.apprenticeship.gov/industry-recognized-apprenticeship-program>

<sup>36</sup> <https://www.regulations.gov/document?D=ETA-2019-0005-0001>

<sup>37</sup> Ibid

# Key Elements of Apprenticeship

Regardless of whether the apprenticeship is registered or unregistered, each program consists of the same five key elements.

Employer involvement is the cornerstone. Employers will have the opportunity to shape apprentices to meet their objectives, but the first step is organizational commitment. Companies pair apprentices with experienced staff who provide the first of the five required elements: on-site **mentorship**. Mentors guide apprentices through the transition into a company's workforce, provide face-to-face training to help mentees grow into their new roles and give apprentices someone to whom they can ask questions.

The second element of a program is rewards to apprentices for skills gained through **compensation**. Apprentices are compensated as soon as they begin training or working, first at a percentage (usually about 60%) of the standard wage for the role and then increasing as they reach learning milestones. Employers make dedicated investments to each apprentice — one of the key differentiators between apprenticeships and other training programs such as internships. Offering paid apprenticeships instills a sense of responsibility and mutual commitment. That motivates apprentices to bring their whole selves to their workplaces and devote more attention to learning the material.

Third, an apprenticeship must include **on-the-job training (OJT)** provided by the employer. Employers train successful apprentices to meet company and industry standards, and gain productive employees from day one. Apprentices take part in day-to-day operations at their jobs, solving real-world problems. By the end of the program, apprentices emerge on par with their full-time colleagues and, in many cases, as full-time employees.

Fourth, apprentices take part in **related technical instruction (RTI)**, giving them a foundation of academic knowledge and technical skills on which to build. Programs can tailor instruction to the demands of their industries and structure it based on nationally established standards. Depending on their needs, companies may offer RTI in-house or partner with community colleges, technical schools or dedicated apprenticeship training schools. RTI can be provided in-person or online, and employers can decide whether to hold training during work hours or on the apprentices' own time.

Upon completing a program, apprentices have the skills to work in the position for which they have been trained, and receive an **industry-recognized credential**, the final key element of an apprenticeship. Credentials signify to an apprentice's current and possible future employers that he or she meets the standards for the industry and is fully qualified to fill that role at any company.

## The Five Elements of an Apprenticeship



# Postmates

Even before he set foot in the U.S., Remi Zandieh was thinking about how he was going to build a new career.

Zandieh left behind a job as a graphic designer and photographer in his native Iran. Though he was already well established in his home country, he knew that when he arrived in a new one, his academic credentials would not afford him the professional network he needed to land the job he wanted. To make ends meet, Zandieh found freelance and retail jobs. However, those roles gave him no outlet for his creative skills.

“I was not feeling like myself anymore. I was not doing what I was built to do,” Zandieh said. “My talents were not being used, so for me, it was not a happy life.”

Then Zandieh came across TechSF, an initiative of the San Francisco Office of Economic and Workforce Development. Among other things, TechSF promotes apprenticeships in the Bay Area, helping tech companies recruit apprentices and ensure that their programs meet DOL standards.

Postmates, a logistics platform that connects customers with local couriers, was one of the companies that signed on with TechSF.

“There’s an extraordinary [amount] of talent within the Bay Area physically that maybe didn’t mirror that traditional pathway of a certain degree from a

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“There’s an extraordinary [amount] of talent within the Bay Area physically that maybe didn’t mirror that traditional pathway of a certain degree from a specific school, but still has numerous skills that are important for company needs and business needs.”

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specific school, but still has numerous skills that are important for company needs and business needs,” said Vikrum Aiyer, vice president of public policy and strategic communications, Postmates.

Zandieh applied to the TechSF Apprenticeship Accelerator and was placed at Postmates as the company’s first-ever apprentice. Seven months later, the company offered him a full-time position as a production artist.

“This apprenticeship rescued me from that survival life situation,” he said, and enabled him to return “to where my real ‘me’ was.”

Aiyer credits the program with giving Postmates

the freedom to incorporate apprenticeships into its talent pipeline. The still-growing company began expanding its earn-while-you-learn efforts, making it easier for Postmates couriers to move seamlessly into corporate positions.

A plan for an apprenticeship dedicated to creating autonomous, LiDAR-enabled delivery robots is already in the works.

Postmates' initiatives are part of the company's efforts to keep pace with a changing workforce. Roughly 300,000 people work as couriers for the company, ferrying groceries, takeout and other goods from businesses to customers on demand. That kind of gig economy work — and the mentality behind it — will play a substantial part in the workforce of the future.

With that reality comes a need to address how training methods for all workers should adapt to meet the workforce needs that tech companies such as Postmates have had a hand in developing.

“When you think about technology platforms, you're not just thinking about jobs that need filling and where you get that talent,” Aiyer said. “You have to think about what the workforce of tomorrow looks like and how your products are responsible for creating that tomorrow, today.”

While Zandieh's success proved that an apprenticeship facilitated by TechSF could succeed at Postmates, the company could not rely solely on an external partner.

Introducing apprenticeships into any company requires internal support to complement the external recruiting and training efforts.

“You also need to evangelize inside the building,” Aiyer said.

That meant coaching existing employees in how to work effectively with apprentices, and in understanding the differences between an apprentice and an intern.

“All of those things require an outside game as well as an inside game,” Aiyer explains, “and I think being able to start with an experimental partner in TechSF was extraordinarily helpful for that.”

For Zandieh, the apprenticeship helped create a new future in an industry that valued his experience, giving him the chance to learn needed skills without starting from scratch.

## International Apprenticeships Models

As U.S. business and government leaders look to create apprenticeship opportunities, they can draw on two exceptional examples across the Atlantic: Germany and the United Kingdom.

Apprenticeships and vocational schools in Germany date back to well before the 20th century. In the post-war years, they developed into a cornerstone of the country's workforce, a trend that continues today.<sup>38</sup> As of 2014, nearly 60% of young people in Germany participated in an apprenticeship,<sup>39</sup> compared to only 5% of their U.S. counterparts.<sup>40</sup> German apprentices have the opportunity to train in everything from manufacturing to banking to information technology; and each year more than 500,000 new apprentices<sup>42</sup> enter programs throughout the country. German companies spend anywhere from \$25,000 to \$80,000 on each apprentice.<sup>42</sup> In addition to the substantial cultural changes that would be necessary to expand U.S. apprenticeships to a comparable level, American companies would need to make far greater investments than they do today.

The United Kingdom also has a longstanding tradition and vibrant apprenticeship ecosystem. Nearly 376,000 apprentices in the U.K. started

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As of 2014, nearly 60% of young people in Germany participated in an apprenticeship, compared to only 5% of their U.S. counterparts.

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programs between August 2017 and July 2018,<sup>43</sup> with nearly 815,000 participants overall — almost 1.2% of the country's total population. (If a comparable share of the U.S. population were to participate in apprenticeships, the group would total almost four million people.)

Government support contributes to the strong culture of apprenticeships abroad. In Germany, the government covers the cost of education for apprentices. Each of the 16 German states funds training centers and covers other local costs, while the federal government finances improvements to the overall system. German employers pay the other costs of apprenticeship, including worker wages.<sup>44</sup>

<sup>38</sup> <https://www.apprenticeship-toolbox.eu/germany/apprenticeship-system-in-germany>

<sup>39</sup> <https://www.theatlantic.com/business/archive/2014/10/why-germany-is-so-much-better-at-training-its-workers/381550/>

<sup>40</sup> Ibid

<sup>41</sup> <https://www.apprenticeship-toolbox.eu/germany/apprenticeship-system-in-germany/143-apprenticeship-system-in-germany>

<sup>42</sup> <https://www.theatlantic.com/business/archive/2014/10/why-germany-is-so-much-better-at-training-its-workers/381550/>

<sup>43</sup> <http://researchbriefings.files.parliament.uk/documents/SN06113/SN06113.pdf>

<sup>44</sup> <https://www.apprenticeship-toolbox.eu/financing/funding-arrangements/47-funding-arrangements-in-germany>

The U.K. government also offsets the costs of apprenticeships, most recently by establishing a 2017 levy on businesses with over £3 million in payroll.<sup>45</sup> The money collected from each company is placed into the businesses' own dedicated fund, and the government contributes an additional 10% to help pay for the training and assessment costs of running an apprenticeship program.

In the U.S., state and federal governments support apprenticeships largely through grants.<sup>46</sup> These funds are available for employers and public-private partnerships to help offset some of the educational training and operating costs of apprenticeships.

The U.S. has its own proud history of apprenticeship, and the new wave of 21st century apprenticeships is revitalizing that tradition to equip modern workers with the skills modern employers need.

Employers, apprentices and the U.S. workforce as a whole benefit from the renewed attention on apprenticeships as a training method, but there is more work to be done. To ensure that U.S. employers and workers adopt earn-while-you-learn programs at a rate capable of closing the skills gap, the country will need to undergo a significant cultural shift. To start, Americans should place apprenticeship on par with four-year degrees as an accepted professional pathway.

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Americans should place apprenticeship on par with four-year degrees as an accepted professional pathway.

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<sup>45</sup> <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN03052>

<sup>46</sup> <https://www.dol.gov/featured/apprenticeship/grants>

# II. Why Apprenticeships Matter

Today the tech industry confronts several growing employment challenges. A mismatch between the skills workers have and the skills employers need leaves thousands of in-demand jobs unfilled.

From 2013 to 2019, the share of STEM graduates earning computer science degrees more than doubled from 3% to 8%.<sup>47</sup> Despite that increase, the pace of innovation has accelerated so dramatically that many four-year degree programs can no longer produce enough graduates to meet tech companies' demands.

By 2020, Code.org estimates that one million tech jobs will go unfilled due to a lack of qualified workers.<sup>48</sup>

Meanwhile, for some, the rising cost of college closes off the traditional four-year degree pathway into tech jobs, making it harder for hiring managers to build more diverse and inclusive workforces. When it comes to hiring women and people of color, the tech industry consistently lags behind other sectors. Apprenticeships are a highly effective way to address many of these challenges.

## Benefits to the Employer

Apprentices start work with their employers on day one and can be fully-trained employees in as little as one year. By hiring apprentices, employers build not only the skills they need in their employees, but also the skills American workers will need to thrive in tomorrow's workplaces. Apprenticeships provide education and work-based learning in technical skills such as coding and software development as well as crucial soft skills including effective communication, teamwork and problem solving.

A remarkable number of apprentices stay at the companies that train them. Employees who complete a registered apprenticeship have an estimated retention rate of 89% over three years.<sup>49</sup> That's a stark contrast to more general turnover

rates. In 2018, an estimated 41 million Americans voluntarily quit their jobs, up 8% from the year before.<sup>50</sup> That number is expected to grow to 47 million by 2020.<sup>51</sup>

By hiring apprentices full-time after their programs and reducing employee turnover overall, an employer saves on the costs of hiring and training staff and builds a well-equipped workforce for the long term. In a 2009 Urban Institute study of more than 900 apprenticeship sponsors, 86% of responders said they would strongly recommend registered apprenticeships to others. In the same study, 68% said the programs raised productivity and strengthened workplace morale.<sup>52</sup>

<sup>47</sup> <https://medium.com/codeorg/computer-science-climbs-to-4th-most-popular-stem-major-for-college-bound-students-773ce681b96c>

<sup>48</sup> <https://www.zdnet.com/article/code-org-solving-our-cs-shortage-1-teacher-1-student-at-a-time/>

<sup>49</sup> <https://jobs.utah.gov/apprent/apprentroi.pdf>

<sup>50</sup> <https://www.shrm.org/hr-today/news/all-things-work/pages/to-have-and-to-hold.aspx>

<sup>51</sup> Ibid

<sup>52</sup> [https://www.urban.org/research/publication/benefits-and-challenges-registered-apprenticeship-sponsors-perspective/view/full\\_report](https://www.urban.org/research/publication/benefits-and-challenges-registered-apprenticeship-sponsors-perspective/view/full_report)

Higher retention rates and productivity lead to a proven return on investment from apprenticeships. International studies estimate that for every dollar an employer spends on apprentices, they gain nearly \$1.50.<sup>53</sup> Apprentices are more likely to remain on the payroll than other new hires,<sup>54</sup> saving employers the costs of recruiting and onboarding workers.

Companies can apply for DOL funds<sup>55</sup> to offset some of the costs of running an apprenticeship. Businesses, trade associations, educational institutions and other organizations with apprenticeships have access to grant money to run and expand their initiatives. In June 2019, for example, the DOL made over \$183 million more in federal funding available to educational institutions partnering with companies on apprenticeship efforts.<sup>56</sup>

Aside from the federal financial incentives, many states offer tax credits to employers to offset the training or education costs of operating a registered apprenticeship program.

Incorporating apprenticeships creates wider avenues for hiring and talent acquisition and helps build more diverse and inclusive workforces. A 2017 Urban Institute report examining the impact of state apprenticeship agencies on diversity found that the number of people of color in apprenticeships grew from just over 20% in 2000

to more than 40% in 2016.<sup>57</sup> That trend follows similar upward growth in the number of active apprentices and new programs nationwide.

Adopting apprenticeship in tech creates the possibility of a tech sector that more accurately reflects the society in which it operates. Additionally, the more diverse the tech sector becomes, the better its products will serve us. Improving diversity at the source of innovation will ensure that technologies such as speech and facial recognition function as intended for users of all backgrounds.

For tech companies — and all companies — diversity means more perspectives, more creativity and more profits.<sup>58</sup> In a survey that measured business diversity and revenue from new products over three years at more than 1,700 companies in eight countries, companies with diverse management teams reported innovation revenue 19 percentage points higher than companies with below-average management diversity.<sup>59</sup>

In addition to recruiting diverse employees, apprenticeships create a host of social benefits. For the first time,<sup>60</sup> five distinct generations are in the workforce.

By incorporating apprenticeships into their hiring practices — and, in turn, instituting mentorships as an element of those programs — employers

<sup>53</sup> <https://www.citylab.com/life/2017/02/why-apprenticeships-are-taking-off/514977/>

<sup>54</sup> <https://www.dol.gov/apprenticeship/toolkit/toolkitfaq.htm#2a>

<sup>55</sup> <https://www.dol.gov/featured/apprenticeship/grants>

<sup>56</sup> <https://www.dol.gov/newsroom/releases/eta/eta20190624>

<sup>57</sup> <https://www.urban.org/sites/default/files/publication/93831/diversity-and-inclusion-in-apprenticeship-expansion.pdf>

<sup>58</sup> <https://www.weforum.org/agenda/2019/04/business-case-for-diversity-in-the-workplace/>

<sup>59</sup> <https://www.bcg.com/en-us/publications/2018/how-diverse-leadership-teams-boost-innovation.aspx>

<sup>60</sup> <https://www.shrm.org/hr-today/news/hr-news/conference-today/pages/2017/5-generations-7-values-endless-opportunities.aspx>

can foster cooperation and communication among the various intergenerational constituencies of employees.

In a multigenerational workforce, experienced mentors can transfer knowledge to younger workers and apprentices while sharpening their own skills and learning from newly-hired or younger colleagues with fresh perspectives.<sup>61</sup>

## Benefits of Apprenticeships for:

### Employers

- A well-trained workforce
- Increased employee retention
- Savings on costs related to employee turnover, including hiring and training
- Access to state or federal grants to offset training costs
- Positive return on investment
- Increased diversity in the workforce

### Apprentices

- Hiring opportunities for nontraditional and underrepresented workers
- On-the-job mentorship
- Pathway into tech jobs without incurring student debt
- Training in high-demand skills
- Increased earnings over the course of a career
- A portable, industry-recognized credential

<sup>61</sup> <https://www.forbes.com/sites/wesgay/2017/10/20/multigeneration-workforce/#54d901eb4bfd>

## Benefits to the Apprentice

Just as employers benefit from hiring through apprenticeships, apprentices reap many rewards of participating in programs. Apprenticeships increase the number of pathways into a company and create job opportunities for talented employees who might otherwise be overlooked.

According to Apprenti, a program of the Washington Technology Industry Association's Workforce Institute, there is greater gender and racial diversity among apprenticeship cohorts.

During a pilot program in Washington state, Apprenti fielded an apprenticeship cohort made up of 38% women, 37% people of color and 27% veterans.<sup>62</sup> In addition, IBM, one of the leaders in current tech apprenticeships, boasts nearly 200 apprentice graduates to date. Of those, roughly one-third are minority employees and 13% are veterans.<sup>63</sup>

These figures are a cut above industry averages. In its most recent *Diversity in High Tech* report,<sup>64</sup> the U.S. Equal Employment Opportunity Commission found that tech companies fell behind private industry when it comes to employing women and minorities.

Tech workforces were comprised of just 7.4% African American workers (compared to 14.4% across private industry), 8% Hispanic workers (compared to 13.9%) and 36% women (compared to 48%).<sup>65</sup>

Apprenticeships mean more professional opportunities for people of all backgrounds and all walks of life. In tech and other industries, apprenticeships empower workers to begin new careers. For some, the rising cost of four-year degrees has become prohibitive, while others may simply want to begin working more quickly than traditional college studies allow.

Apprentices leave their programs equipped not only with industry-specific credentials and, in many cases, guaranteed positions but without the financial burden of student loans. As tuition and fees continue to rise, fewer people can afford the cost of a four-year college education. From 2005 to 2015, the average American's student debt upon graduation from college increased from \$20,000 to \$34,000.<sup>66</sup>

Career changers can also benefit from the earn-while-you-learn approach. For these workers, apprenticeships provide a way into the tech industry without going back to school or starting a new career from scratch.

Apprenticeships offer a solution to would-be students and career changers who cannot shoulder the financial burdens of traditional schooling. Apprenticeships pay from day one and train participants in industry-relevant skills

<sup>62</sup> <https://blog.techinclusion.co/apprenticeship-as-a-tool-to-address-the-diversity-gap-ebe62fd60470>

<sup>63</sup> [https://www.washingtonpost.com/news/powerpost/paloma/the-technology-202/2019/01/08/the-technology-202-technology-companies-turn-to-apprenticeships-in-tight-labor-market/5c338edd1b326b66fc5a1bc9/?utm\\_term=.67137d7e04bc](https://www.washingtonpost.com/news/powerpost/paloma/the-technology-202/2019/01/08/the-technology-202-technology-companies-turn-to-apprenticeships-in-tight-labor-market/5c338edd1b326b66fc5a1bc9/?utm_term=.67137d7e04bc)

<sup>64</sup> <https://www.eeoc.gov/eeoc/statistics/reports/hightech/index.cfm>

<sup>65</sup> Ibid

<sup>66</sup> <https://www.newyorkfed.org/press/pressbriefings/household-borrowing-student-loans-homeownership>

without requiring them to take out tens of thousands of dollars in student loans or pay for training. Once complete, apprentices have an industry-recognized credential that they can take with them from one job to the next. This portable credential retains its value well beyond the end of an individual program.

The financial benefits to apprentices continue beyond the end of their program — the DOL finds that workers who complete an apprenticeship earn an estimated \$300,000 more on average than non-apprentice workers throughout their careers.<sup>67</sup>

The first step toward ushering in the benefits to apprentices, businesses and the U.S. more broadly is widening the pool from which tech companies hire — and ultimately promote — their workers. Apprenticeships provide one of the clearest paths to taking that step, opening the door to talented individuals who might otherwise be overlooked.

<sup>67</sup> <https://www.dol.gov/apprenticeship/toolkit/toolkitfaq.htm#2e>

# Amazon Web Services (AWS)

In 2016, Amazon had hundreds of positions to fill and not enough qualified applicants to fill them.

That was when two members of Ardine Williams' team suggested<sup>68</sup> tapping an unrealized source of talent: veterans.

Williams, a vice president overseeing human resources for Amazon and a former U.S. Army captain, knew the idea's potential firsthand and started the Amazon Veteran Technical Apprentices (AVTA)<sup>69</sup> program.

Amazon worked with Apprenti,<sup>70</sup> a program of the Washington Technology Industry Association (WTIA) Workforce Institute, which helps guide diverse and underrepresented talent into the tech field through apprenticeships. Apprenti put its experience to work filling cloud support positions for Amazon Web Services (AWS).

With Apprenti's help,<sup>71</sup> the AVTA program recruits veterans who are interested in transitioning into the technology field, provides them with three months of classroom instruction and ushers them into a year of on-the-job training and mentorship. Successful graduates earn IT and AWS certifications and positions as Amazon cloud support associates.

Each year, an estimated 250,000 veterans transition to civilian life looking for civilian jobs,

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“Some of the same qualities that make for a successful stint in the military also give [Amazon Veteran Technical Apprentice] candidates an edge in the tech world.”

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according to U.S. Tech Vets,<sup>72</sup> a veteran career and hiring portal with support from the Consumer Technology Association.

For veterans like Terry Dickerson, the idea of making a sudden shift from the military to a corporate environment was daunting. After earning a degree in software engineering from Mississippi State University, he began an 11-year career in the Army that brought him to Kentucky, Hawaii and a tour in Iraq.

“Transitioning from the military, you're used to working on a team and being part of a team,” Dickerson said. “Amazon brought us in as a cohort...all with military background. That made the transition really smooth.”

Dickerson began his apprenticeship training in 2017

<sup>68</sup> <https://www.seattletimes.com/business/amazon/amazon-welcomes-first-graduates-of-program-to-turn-veterans-into-technologists/>

<sup>69</sup> <https://aws.amazon.com/careers/military/>

<sup>70</sup> <https://apprenticareers.org/about/who-we-are/>

<sup>71</sup> <https://venturebeat.com/2018/08/22/seattles-apprenti-seeks-to-take-its-tech-apprenticeship-program-nationwide/>

<sup>72</sup> <https://www.ustechvets.org/careerResources/about>

and, after more than a year as a cloud support associate, now manages the very program that brought him to the company.

Some of the same qualities that make for a successful stint in the military also give AVTA candidates an edge in the tech world, said Nick Curry, senior program manager, AWS Military Recruiting.

“The [AVTA] program takes individuals with determination, who move quickly to solve problems, and offers them the technical and on-the-job training to be successful in a new in-demand career,” Curry noted.

Many members of the military face hurdles in shifting<sup>73</sup> to a civilian position after their service. Some have difficulty becoming qualified in rapidly changing fields, including technology, and it can be hard to interest hiring managers who are unfamiliar with military résumés.

Amazon has recognized these hurdles and plans to expand the initiative to bring veterans into its workforce outside its hometown. Among other skills development programs,<sup>74</sup> the company announced a technical apprenticeship for transitioning veterans, designed to create a talent pipeline for its second headquarters in Arlington, Virginia.

<sup>73</sup> [https://www.va.gov/vetsinworkplace/docs/em\\_challengesReadjust.asp](https://www.va.gov/vetsinworkplace/docs/em_challengesReadjust.asp)

<sup>74</sup> <https://www.ciodive.com/news/amazon-details-roadmap-to-fill-talent-pipeline-as-virginia-hq2-hiring-begin/554327/>

## COMPANY PROFILE

# Adobe

As he recovered from six gunshot wounds, Archy Posada decided he needed a drastic change.

For years, the Compton, California native and former gang member had performed as an opera singer in Los Angeles, but couldn't afford a formal, four-year music degree. After his injuries ended his singing career, and without a diploma to start a new career in the music industry, he decided to relocate to San Francisco to start fresh.

As he worked odd jobs in the Bay Area to make ends meet, Posada was consistently bombarded with marketing trinkets from tech companies. The advertising swag sparked an idea in him to find a way into an industry that was clearly a significant part of the local workforce, and he began teaching himself to code.

Not long after that, he launched his own marketing business that catered to tech companies. In the process of brushing up on programming languages, he discovered the Adobe Digital Academy apprenticeship and applied.

The Academy consists of two phases: Classroom training with an educational partner — in Posada's case with General Assembly, an education company that helps students develop in-demand skills — followed by three months of on-the-job training with Adobe's engineering and design teams.

The program was started to address Adobe's demand for technical talent and its desire to build a pathway into tech careers for people with work experience outside the industry.

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The expectation that learning will continue on the job guarantees that apprentices, as well as other Adobe employees, will be equipped to adapt quickly to evolving industry standards and job responsibilities. That made an impact on Posada from the start. His mentors encouraged him to expand his skills even if it meant risking failure. So far, that attitude has paid off for Adobe: 96% of its apprentices remain as employees.

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Since it launched nearly two years ago, apprentices from all walks of life — from refugees with the equivalent of a Ph.D. to a former stay-at-home mom without any traditional work experience — have participated in the program.

Adobe considers work experience anything “from service industry jobs to running a household,” said Liz Lowe, senior program manager, Adobe Digital Academy. “The value is really in a candidate's mindset versus their concrete work experience.”

A key part of the company's approach to the apprenticeship is the assumption that participants won't stop learning once they've completed the formal education portion of the Digital Academy.

"The learning doesn't stop after the training with the education partners," Lowe said. "The [programming] language that is being used can differ or the tech can vary so greatly, we really believe that that second piece of experience is critical for training individuals."

The expectation that learning will continue on the job guarantees that apprentices, as well as other Adobe employees, will be equipped to adapt quickly to evolving industry standards and job responsibilities. That made an impact on Posada from the start.

"The most unexpected lesson was that it really is all about the learning," Posada said. "I remember being so afraid I was going to do something wrong, or that I wasn't going to be able to deliver."

His mentors quickly put those fears to rest, he explained, and encouraged him to expand his skills even if it meant risking failure. So far, that attitude has paid off for Adobe: 96% of its apprentices remain as employees.

"It just means the world to me that a company like Adobe can take a chance and bet on my ability to provide value," Posada said.

Adobe plans to expand the number of tracks available to apprentices to continue providing an alternative for prospective employees without traditional degrees.

## COMPANY PROFILE

# Bosch

For a company with 400,000 workers scattered across the globe, Bosch developed an apprenticeship program for a new collar role at lightning speed.

Over the course of a single week in July 2019, Bosch managed to design a program from the ground up and submit it for approval by the Department of Labor. Bosch plans to launch the apprenticeship by the end of the year to help fill some of its hundreds of open software engineer positions.

The tech and engineering giant, which has \$80 billion in sales and a foothold in everything from cell phones to appliances to automobiles, built on the apprenticeship model developed by IBM and available to all members of the CTA Apprenticeship Coalition.

Like many other tech companies, Bosch has difficulty finding skilled workers to meet its hiring needs, especially in software engineering.

“We’re all fighting for the same talent right now, and there’s a shortage,” said Tonya Gehrt, vice president, human resources, Bosch North America.

The new program is part of a push to change the way the company hires.

“When we look at the number of positions that we’re going to have to fill with this talent in the next two years, it’s not realistic on one hand to develop that talent internally and it’s also not realistic to find that talent out in the workforce graduating with a four-

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“We have to diversify the way we’re looking for talent, and the old mentality and the ways in which we recruited in the past aren’t going to take us into the future and where we need to go.”

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year degree,” said Kavita Phadke, director of talent development, Bosch North America.

Bosch decided to cast a wider net and recruit from a more diverse pool, including workers without a formal education in computer science.

“We have to diversify the way we’re looking for talent,” Phadke said, “and the old mentality and the ways in which we recruited in the past aren’t going to take us into the future and where we need to go.”

By the end of 2020, the company aims to have apprentices fill 10% of the 340 open positions that are currently vacant because applicants lack software development experience and other critical skills. Bosch plans to hire more apprentices in coming years.

Part of that goal hinges on how quickly Bosch managed to get its apprenticeship program off the ground. The company set out to prove that with the right people in place, a registered apprenticeship can be set up quickly.

The program will start small to give the company time to work out details and guarantee that apprentices receive the support and mentoring they need.

The first few cohorts will be critical to the program's overall impact on the company, Gehrt adds. A successful round of graduates in the first and second years of the program will go a long way toward proving that candidates without a four-year degree can be just as successful with a shorter, highly-focused training process.

"I think that our first round of graduates — if they hit the ground running and are able to quickly make an impact in the area that they're responsible for — then I would say that we would see people start to open their minds more," Gehrt said.

Gehrt, Phadke and other Bosch executives behind the program are already looking beyond the first class of apprentices. Within the next three to five years, Bosch plans to expand the program to include other tracks — including data analytics and cybersecurity — to meet the company's changing hiring needs.

# III. Key Stakeholders in the Apprenticeship Ecosystem

## EMPLOYERS

An apprenticeship always requires an employer. Even in situations where an apprenticeship is started and run by a third party, it is the employer that provides on-the-job training, facilitates mentorship between senior employees and apprentices and pays apprentices' wages. In many cases, employers hire apprentices as full-time workers once they have successfully completed a program.

Employers have great flexibility to customize apprenticeships to suit their needs. Businesses can manage every part of their programs in-house, overseeing OJT and RTI in addition to their other responsibilities, or outsource one or more of those responsibilities to other partners in the apprenticeship ecosystem.

The former method gives employers the greatest degree of control over an apprenticeship. By designing, administering and facilitating each element, an employer can tailor each to its own needs.

Enlisting partners enables employers to design and run in-house apprenticeships with fewer internal resources.

## SPONSORS

**Sponsors** are people, associations, committees or organizations that operate registered apprenticeship programs.<sup>75</sup> In many cases, the employer is the sponsor. In others, a business association, community college, labor management association or community-based organization may fulfill the role.<sup>76</sup> For companies with fewer resources to identify and cultivate talent, outside sponsors can be appealing.

Sponsors are responsible for registering the apprenticeship with state and federal government agencies, if necessary, and ensuring that the program meets the relevant criteria. An outside sponsor will monitor both the employer and the apprentices in a program and provide reports if agencies require them.

However an apprenticeship is set up, sponsors define its standards, perform the registration process if it will be a state- or federal-registered apprenticeship and administer the program.

<sup>75</sup> <https://www.apprenticeship.gov/partner-finder>

<sup>76</sup> Ibid

## TRAINING PROVIDERS

Like employers, training providers constitute an essential element of apprenticeships. A trainer can be a four-year college, a community college, an occupational school or a career or technical school that “delivers academic and skills instruction driven by industry standards.”<sup>77</sup> These can also include non-traditional educational institutions, such as online courses or coding bootcamps.

Training providers work with employers to develop a curriculum that complements on-the-job training.<sup>78</sup> By partnering and connecting with employers in a specific field, educational institutions ensure that their students are well-prepared to perform in their roles as apprentices and, eventually, as long-term employees.<sup>79</sup>

In the process of delivering instruction, trainers can administer competency testing and confer credentials based on the results. Institutions can also help apprentices find support — including additional academic or financial assistance — or aid employers in identifying and recruiting potential apprentices.<sup>80</sup>

## INTERMEDIARIES

**Intermediaries** are “organizations with the capacity, expertise and network to help businesses successfully create, launch, and expand apprenticeship programs.”<sup>81</sup> These organizations can range from labor associations to workforce development boards or community and technical colleges.<sup>82</sup>

Intermediaries can help employers maximize the impact of their apprenticeships by providing subject matter expertise, offering technical or curriculum-building assistance or liaising with educational institutions to help apprentices earn college credits.

Intermediaries fulfill multiple roles in the apprenticeship ecosystem. They may facilitate the creation of apprenticeships by drawing on expertise in a specific industry, advising employers that need assistance designing or administering their programs or take on some of the administrative duties for programs that are already in place.<sup>83</sup> For example, intermediaries can take on the screening and hiring process, provide RTI on behalf of an employer or support apprentices as they progress through a program.

No matter how large an employer, intermediaries can help it offload some of the responsibilities of developing or running an apprenticeship program. For small businesses, that could mean creating a cohort of apprentices from several employers and facilitating RTI.

Intermediaries can help with designing apprenticeship programs or registering them with the relevant agencies. If an intermediary registers a program, it will also be the sponsor for the apprenticeship, and carry out the regular duties of a sponsor, including overseeing apprentices’ training and ensuring that they earn an industry credential upon completion.

<sup>77</sup> <https://www.apprenticeship.gov/partner-finder>

<sup>78</sup> <https://www.dol.gov/apprenticeship/toolkit/toolkitfaq.htm#1b>

<sup>79</sup> <https://www.apprenticeship.gov/educators>

<sup>80</sup> <https://www.apprenticeship.gov/partner-finder>

<sup>81</sup> Ibid

<sup>82</sup> <https://www.apprenticeship.gov/employers/intermediaries>

<sup>83</sup> Ibid

## FEDERAL & STATE GOVERNMENT

Both state and federal governments can provide a range of support for apprenticeships, from the financial to the more intangible, such as guidance and planning resources for employers. At the national level, the DOL Office of Apprenticeship (OA) oversees registered apprenticeships. The DOL certifies that programs comply with safety requirements, meet quality standards and are eligible for certain tax credits.

Twenty-five states and the District of Columbia<sup>84</sup> operate State Apprenticeship Agencies (SAAs). These state agencies — which are approved by the DOL — are responsible for approving and registering federally recognized apprenticeships in their states.<sup>85</sup>

Each state with an SAA must first pass its own apprenticeship law and apply to the DOL to recognize it before a state agency can begin carrying out its obligations as an apprenticeship regulator.<sup>86</sup> States may pursue the SAA method to have more control over apprenticeships and the standards they must meet, above and beyond national guidelines.

<sup>84</sup> <https://www.doleta.gov/OA/contactlist.cfm>

<sup>85</sup> <https://fas.org/sgp/crs/misc/R44174.pdf>

<sup>86</sup> <https://www.law.cornell.edu/cfr/text/29/29.13>

# Northern Virginia Community College (NOVA)

When Amazon went looking for a training partner to expand its Veteran Technical Apprenticeship (AVTA) program to the East Coast, the Northern Virginia Community College (NOVA) was a natural fit.

Situated in an area not far from the Pentagon, with a thriving technology sector and a large population of current and former military personnel, NOVA was already well-established as a training provider.

AVTA offers apprenticeships to transitioning veterans and their spouses, pairing in-classroom training with on-the-job learning to launch former military personnel into new careers in the tech industry. Apprentices first spend 10 to 12 weeks as a cohort on campus at NOVA, learning technical skills before starting on-the-job training.

The partnership was NOVA's first foray in providing technical instruction for apprentices, but it quickly picked up steam.

Near-constant communication is the bedrock of the program. Instructors and mentors check in regularly with participants and NOVA staff reach out to corporate partners to ensure their needs are being met.

NOVA staff considers frequent communication a foundation for its students' and program's success. Trung Ngo, who manages the program, and her team know a cohort is progressing well when students contact them frequently — and when they receive feedback from apprentices or instructors on areas of improvement, they quickly address it. During one weekly check-in, some students

reported feeling adrift in class. Ngo and Melanie Stover, NOVA's director of corporate and workforce engagement, brought that feedback to the instructor and helped better tailor the course to meet the students' needs.

That flexibility also extends to corporate partners and beyond, allowing the program to keep pace with rapid developments in tech, including changes in software and certification criteria.

“One of the unique things that community colleges are positioned to do through instruction is be flexible to employer needs,” Stover said.

In the two years since NOVA's partnership with Amazon began, 200 apprentices have entered the program. Participants have ranged in age from 20 to 60, including those with several years of civilian work experience and those fresh out of military service.

As of mid-2019, Stover was working with a dozen corporate partners to scale the program significantly. She credits Amazon's partnership with demonstrating that apprenticeships can succeed in the tech sector.

“An apprenticeship program signals that a company is making an investment in you,” Stover said. “It's investing in your professional growth, by training and mentoring you, and putting you on a path to succeed there.”

# IV. Models of Apprenticeship

Employers can take a range of approaches when establishing an apprenticeship. Each comes with its own set of advantages and can be tailored to fit the needs of an individual employer. This inherent flexibility guarantees that there is a path forward for every company interested in starting a program, regardless of size, industry or workforce needs.

## In-House Programs

To operate an in-house registered program, the sponsoring employer pays apprentices, provides OJT and arranges RTI (instruction may be provided by a third party, but must be coordinated and approved by the sponsoring company). In an employer-sponsored registered apprenticeship, the employer ensures participants complete the program with a national occupational credential.

In-house programs afford companies control over how they select, train and ultimately hire apprentices, and give employers direct access to funding and financial incentives to help offset the cost of RTI.

IBM and Bosch are examples of companies that opted for in-house programs. As an existing tech industry powerhouse with branches in everything from software engineering to cybersecurity and data analysis, IBM runs every aspect of its apprenticeship program. In the process, company leaders ensure that each element of the program is specifically tailored to equip apprentices with

the skills they need to succeed in the day-to-day functions of an IBM position.

Like IBM, Bosch chose to develop an in-house program. The company has long been a leader in manufacturing but, as tech becomes integrated into all industries and as Bosch began delving further into the Internet of Things (IoT), business leaders made the decision to pursue apprenticeships as the best way to train a new crop of highly-skilled employees for software engineering roles.

Bosch, a German-based company, has a history of successful apprenticeships overseas, and in recent years has pushed its existing European programs to adapt to a changing manufacturing industry.<sup>87</sup> Using that experience and building on its slate of successful apprenticeships, Bosch designed its first North American tech-centered apprenticeship to be launched in Michigan.

<sup>87</sup> <https://www.bosch-presse.de/pressportal/de/en/press-release-47168.html>

# IN-HOUSE PROGRAM COMPANY PROFILE

## IBM

More than a year before IBM CEO Ginni Rometty took the stage at CES 2019 to announce her commitment to expanding apprenticeship opportunities, Joshua Hannaford launched his career at IBM as an apprentice himself.

Hannaford is one of hundreds who has completed an IBM apprenticeship and then joined the company as a full-time employee. Like many apprentices, his entry into the tech industry wasn't a straight path from a university to the workplace.

Hannaford initially pursued a four-year degree at North Carolina State University, but health problems cut his college career short during his freshman year. After a stint as the manager of a local shoe store, he enrolled in IT and mobile application courses at a local community college.

Before long, Hannaford was working with one of the college's department heads. When the department head learned of IBM's tech apprenticeship program, she put the application on Hannaford's desk and encouraged him to apply. He did — completing the program and eventually joining IBM as a software engineer.

Until recently, Hannaford's path into the tech industry would have been considered unusual. Faced with the same talent shortages as other tech companies, IBM has turned to apprenticeships to meet a need for skilled workers. Its programs train and mentor a cohort of apprentices through a subject area, ranging from software engineering to cybersecurity and data analysis.

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“We were able to develop a formal curriculum that allows our apprentices to train in each of the areas that we have a need for in the industry. [Apprentices] were able to start working with our clients out of the gate, with an understanding of what they needed.”

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“The diversity of roles offered by apprenticeship is matched by the diversity of the apprentices themselves,” said Jennifer Oddo, program manager, workforce and apprenticeship initiatives, IBM.

To date, a barista, nurse, firefighter and farmer have all made their way through IBM's program.

Despite their differences, all the IBM apprentices show a willingness and aptitude to learn the skills IBM needs. That common thread among the apprentices has proven crucial to making the IBM program a success.

In the course of its program, IBM has learned unexpected lessons, including that career changers sometimes make the greatest contributions. “We weren't expecting that population to be interested in these jobs, but they are probably some of our most successful,” Oddo said. “These individuals

have experience in the workforce; they have the professional skills; they understand how the world works a little bit more.”

Even as they themselves learn in apprenticeship training, career changers often teach and mentor fellow apprentices and first-time employees in customer relations, workplace culture and other more social dimensions of the job.

The addition of apprentices has helped IBM find employees in difficult-to-fill areas. Trey Clark, an associate partner and manager for the cybersecurity apprentices, has seen the benefits of taking on apprentices first-hand in IBM's rural centers, where top talent is scarce.

The impact of the vacant positions on IBM is vast. Cybersecurity positions require workers to handle everything from application development to data management and blockchain issues and to monitor operations 24/7, making it especially crucial to hire qualified candidates.

“When we have a shortage of resources, we're not able to address our clients' needs,” said Shue-Jane Thompson, vice president and partner for biometrics and cybersecurity, IBM, “in addition to the fact that we're not able to cover all the necessary cyber operations.”

In response, the company developed an apprenticeship program to help meet the round-the-clock need for cyber workers.

“We were able to develop a formal curriculum that allows our apprentices to train in each of the areas

that we have a need for in the industry,” Clark said. Apprentices “were able to start working with our clients out of the gate, with an understanding of what they needed.”

As one of the largest companies promoting new collar jobs — a phrase Rometty coined — IBM plans to double down on increasing the availability of apprenticeships. The company plans to roll out new apprenticeships in graphic design, human resources and computer support.

# Phone2Action

Some companies opt to build an apprenticeship from the ground up, either internally or with the help of third parties. Others, including the Arlington, Virginia-based Phone2Action, realize they already have many of the elements of an apprenticeship in place and decide to make it official.

Founded in 2012, Phone2Action was the first all-in-one software platform to help advocacy groups mobilize constituents at scale.

In 2015, the company started its Civic Tech Fellows program, which brings in high schoolers, college students and post-graduate professionals for a summer of practical training. In 2019, Jennifer Leo, chief of staff, Phone2Action, said the company learned through the CTA Apprenticeship Coalition that its Fellows initiative met many of the criteria for formal recognition. The fellowship had organizational buy-in, a strong mentorship system and on-the-job training — all key elements of an apprenticeship.

With those building blocks established and with the help of an SAA in Virginia, Phone2Action launched its first apprenticeship program.

“We want to support people who never would have thought that working in technology was an option for

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them” Leo said. Registering an existing program as an apprenticeship allowed the company to deepen its commitment to building a talent pipeline and opened up practical benefits including funding.

On the last day of its 2019 summer fellowship, three Phone2Action fellows transitioned into full-time apprenticeship roles in quality assurance and software development. The company hopes to see the same success with its apprentices as it has with its fellows, transforming diverse individuals with varying degrees of technical proficiency into skilled full-time employees.

## Intermediary-Led Programs: Building an Apprenticeship with Third Parties

Some companies seeking to integrate apprentices into their workforces decide to hire intermediary organizations to oversee or assist with one or more aspects of a program.

By hiring an intermediary, an employer can offload a variety of roles and reduce some of the demands of launching an apprenticeship. An intermediary may run an apprenticeship entirely or handle specific responsibilities, such as creating occupational standards, registering a program, recruiting applicants and/or providing RTI. Intermediaries can leverage their expertise and economies of scale to accelerate the development of a program and streamline its administration once in place.<sup>88</sup>

Those benefits make an intermediary-led approach to apprenticeship ideal for small employers or ones that need to fill in-demand roles quickly (in less than one year). Music streaming platform Pandora, for example, hired intermediary Onramp to accelerate the development of its apprenticeship. Like many tech companies, Pandora faced many chronically unfilled positions. The company leaned on Onramp's expertise to recruit, screen and hire applicants, as well as provide training before apprentices started on the job.

By hiring Onramp, Pandora leaders could remain focused on their key roles and eliminate the demands of recruiting, screening and training the

next cohort of apprentices, said Dave Edwards, director of engineering programs, Pandora. Edwards helped create Pandora's Demo Tape apprenticeship for software engineering.

Amazon also hired an intermediary, Apprenti, to facilitate its Veteran Technical Apprenticeship program. Apprenti screens and assesses applicants and provides classroom instruction once apprentices begin their work at Amazon.

Intermediaries offer services to more than one business hiring for similar roles. In this scenario, an intermediary may administer a program or organize RTI for a cohort of apprentices who work for different employers. By doing so, an intermediary can meet the needs of multiple employers at once.

Franklin Apprenticeships serves as an intermediary for groups of small- and medium-sized businesses. The process begins with Franklin identifying in-demand roles and establishing a program to train apprentices from several different employers. Franklin provides virtual, in-class training to the entire cohort, which apprentices apply at their respective workplaces.

An intermediary-led model helps fill an important niche in the apprenticeship ecosystem, said Kim Nichols, CEO, Franklin Apprenticeships. Too often business owners are unsure of how to begin the

<sup>88</sup> <https://www.apprenticeship.gov/employers/intermediaries>

process of bringing apprentices into their workforce or are intimidated by the idea of launching their own program.

By taking on some of the work that might overwhelm a small or medium-sized operation, intermediaries bring apprenticeship to a segment of businesses that might otherwise write it off as a hiring strategy. The result is better-trained workers for more companies and significantly more opportunities to enter the tech workforce for talented employees who might be overlooked.

The range of potential benefits of hiring an intermediary is widespread.<sup>89</sup> Businesses like Franklin Apprenticeships can connect employers with other players in the apprenticeship ecosystem including labor groups and community colleges, perform outreach on behalf of companies to help recruit applicants and support apprentices through the training process.<sup>90</sup>

<sup>89</sup> <https://www.jff.org/points-of-view/seven-ways-intermediaries-help-develop-apprenticeship-programs/>

<sup>90</sup> Ibid

# Pandora

The idea that talented tech workers might not come with traditional pedigrees was not foreign to Dave Edwards, director of engineering programs, for music streaming platform Pandora. After all, some of his former colleagues had built tech careers with poetry degrees.

Edwards began his software development career in the burgeoning tech industry of the 1980s when computer science programs were in their infancy and graduates were few and far between. Now, Edwards again sees an opportunity to find skilled employees outside traditional pathways in the modern tech world.

Out of that vision, Pandora hired Onramp, a startup helping companies create and run apprenticeships.

From the start, Edwards knew Pandora would be best served finding a partner to take over certain elements of running an apprenticeship. Eventually, he decided to hire Onramp to run Pandora's unregistered apprenticeship — Demo Tape — in software engineering.

The Demo Tape program is open to applicants who have some software development experience. Participants go through an initial training period before joining a Java services or Android app development team at Pandora.

“What companies don't understand,” said Lateesha Thomas, CEO, Onramp, “is that they're trying to, essentially, fit a square peg into a round hole when they use the same assessment tools that they use for computer science grads or people who are in the

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“What companies don't understand is that they're trying to, essentially, fit a square peg into a round hole when they use the same assessment tools that they use for computer science grads or people who are in the industry to assess those career changers.”

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industry to assess those career changers. And they're largely filtering them out of the process.”

A key difference in the Onramp process is a focus on learning and growth potential rather than the knowledge a candidate has at the time. Onramp considers an applicant's life experience in addition to other quantitative assessments. Potential applicants answer an essay question, for example, explaining how their life experience led them to where they are now.

After an initial skills assessment, candidates are given materials to help them develop technical skills they will need during an apprenticeship before returning for another round of assessments. The candidates who demonstrate an ability to learn and show growth are most likely to be accepted into the program.

Apprentices can work in Pandora's offices in Oakland, California or Atlanta, Georgia, and are eligible to stay on as full-time employees once they complete the program.

Alexandra Wright was an apprentice in one of the first Demo Tape cohorts in Oakland. She had an interest in technology from an early age, but entered a psychology program in college. A sophomore-year Python class sparked her interest in software development, but she did not have the time or money to switch majors.

Instead, she self-taught to earn an IT certification and launched her own small business. She then found an IT job at another company before deciding to leave to devote time to a coding bootcamp.

But once she finished, she spent up to eight hours a day job hunting, practicing for technical interviews and submitting applications. Time and again, she was passed over because she did not have a computer science degree.

Wright's experience is common, said Howard Sueing, CTO, Onramp. Too often, hiring requirements go beyond what day-to-day work requires.

"If you need to put butts in seats and you want diversity of types of people, and someone maybe isn't nailing your technical assessment today, but... you can tell that with, say, two months of additional training and support and mentorship they would be there, is it really worth declining that person?" Sueing said. "Aren't you losing out on talent?"

During the application process, Wright impressed members of the Onramp team with her ability to learn new material, and before long she was working in Pandora's Oakland office.

Thousands of bootcamp grads have the skills to meet the demands of tech roles but career changers, like Wright, are too often filtered out during the hiring process, Thomas said. Onramp's approach is to tweak that process to guarantee talent isn't falling through the cracks.

Companies that adopt apprenticeships will be more prepared for the shift Sueing sees coming in the way tech employees are onboarded. The number of tech workers hired via apprenticeships will grow, he said, and intermediaries like Onramp will offer a consistent talent pipeline to fuel that change.

## State-Sponsored Programs

In addition to in-house and intermediary-led programs, some states offer their own programs to facilitate apprenticeships. Initiatives vary from one state to the next, but states may provide employers help with elements such as recruiting or training apprentices.

Missouri labor officials used a \$1.3 million State Apprenticeship Expansion grant from the DOL to build out the state's registered apprenticeship program in 2019.<sup>91</sup> The program pairs public funds with approved employer initiatives to increase the number of available jobs and increase wage levels for state residents.

In Virginia, approximately 2,000 businesses have taken part in the Virginia Registered Apprenticeship program.<sup>92</sup> Apprentices in the program complete 2,000 hours of OJT and 144 hours of RTI. Employers register their programs with the state and meet other general program standards, including appropriate training schedules and the ratio of apprentices to experienced workers,<sup>93</sup> but retain the flexibility to tailor the apprenticeships to their job roles.

Colorado has taken a multi-pronged approach to encourage apprenticeship adoption. The state's Department of Labor includes a Work-

Based Learning unit that acts as a consultant to employers, helping existing programs recruit, assess and train apprentices.<sup>94</sup>

In addition, Colorado contracts youth apprenticeship program CareerWise to give students an alternative to college. Based on a Swiss apprenticeship model, CareerWise places high school juniors into apprenticeships in a variety of fields. Once there, they receive on-the-job training and earn a wage while still attending regular classes.<sup>95</sup> At the end of the three-year program, which extends one year after high school graduation, apprentices have an industry certification, real-world experience and higher education credits.<sup>96</sup>

In Missouri, Virginia, Colorado and other states, including Iowa,<sup>97</sup> Wisconsin<sup>98</sup> and Kentucky,<sup>99</sup> state agencies help private businesses that are interested in bringing apprentices into their workforce. These public-private partnerships can guide companies that need help getting their programs off the ground and accelerate the use of apprenticeships to fill open positions.

<sup>91</sup> <https://ded.mo.gov/content/missouri-receives-13-million-additional-apprenticeship-funding>

<sup>92</sup> <https://www.doli.virginia.gov/apprenticeship/>

<sup>93</sup> <https://law.lis.virginia.gov/admincodeexpand/title16/agency20/chapter21/>

<sup>94</sup> [https://www.colorado.gov/pacific/sites/default/files/CO\\_Swiss\\_Apprenticeship\\_Model.pdf](https://www.colorado.gov/pacific/sites/default/files/CO_Swiss_Apprenticeship_Model.pdf)

<sup>95</sup> <https://www.careerwisecolorado.org/students/getting-started/>

<sup>96</sup> Ibid

<sup>97</sup> <https://www.earnandlearniowa.gov/employer>

<sup>98</sup> <https://dwd.wisconsin.gov/apprenticeship/apprentices.htm>

<sup>99</sup> <https://educationcabinet.ky.gov/Initiatives/apprenticeship/Pages/default.aspx>

## Models of Apprenticeship:

### In-House

- Started and administered by the employer.
- Employer is the sponsor and is responsible for overseeing all five elements of the program.
- Employers have full control over each element and may be able to access state or federal funding to offset training costs.

### Intermediary-Led

- Employer pays to have program run by a third party.
- Reduces amount of resources needed from the employer.
- Intermediaries may be the apprenticeship sponsors, and register and administer the programs.
- Intermediaries may facilitate RTI for several businesses with apprentices in similar roles — or may work for a single employer to facilitate its program.

### State-Led

- Offered by several states, including Colorado, Missouri and Virginia.
- Programs are overseen by state agencies and may have a set of standards in place to which employers must adhere.
- Programs may facilitate some administrative or training requirements.

# V. How to Build an Apprenticeship Program

Whether an employer chooses to pursue an in-house, intermediary-led or state-led apprenticeship, the approach to launching an apprenticeship within a company remains largely the same.

The first step is to establish support from senior management and key stakeholders. Business leaders can then identify apprenticeable roles, create framework standards, identify the training provider, develop a mentor program and recruit applicants. If the company chooses to register the program, it can then identify grant funding opportunities.

## Seek Organizational Buy-in

It is important to build a sound foundation of support for an apprenticeship among senior executives, line managers and other key stakeholders within a company. A program is more likely to succeed when all parties are committed.

A crucial first step in building support is engaging with these stakeholders to determine the employer's unmet needs, areas for growth and roles which would benefit from an apprenticeship. These discussions are an opportunity to educate leaders about the elements and benefits of apprenticeship and gauge interest among key decision makers.

HR managers or other members of the company interested in launching an apprenticeship program should build use cases, collect case studies and develop a set of resources to present to other leaders within the company demonstrating why a program would be beneficial to the business.

Other companies that have successfully launched a program, community colleges with an apprenticeship pathway or Chambers of Commerce can all be useful sources of information to provide use cases.<sup>100</sup>

## Determine Program Foundation

With organizational buy-in established, several choices remain about the form of the apprenticeship and how it will be implemented.

Among the first: which apprenticeship model is best suited to the needs of the employer? Business leaders must decide between a registered or unregistered apprenticeship, and whether the program will be sponsored in-house or be built by hiring an intermediary.

<sup>100</sup> [https://www.illinoisworknet.com/DownloadPrint/Chicago-ApprenticeNetwork\\_BridgingtheGap\\_Digital\\_Final.pdf](https://www.illinoisworknet.com/DownloadPrint/Chicago-ApprenticeNetwork_BridgingtheGap_Digital_Final.pdf)

Executives leading the development of apprenticeship programs must also identify specific roles that will be filled by apprentices. These may be positions that are chronically unfilled or which have high turnover rates, but they should be areas where additional talent is needed and where the roles are flexible enough to allow apprentices time to be trained and learn on the job.<sup>101</sup>

Business leaders can then determine the general training structure of the program. A time-based structure sets a specified number of training hours that an apprentice must complete to finish a program. A competency-based model sets skills benchmarks for an apprentice to meet without also setting a fixed number of hours for apprentice training (however, a Registered Apprenticeship Program must be at least 2,000 hours long, even in a competency-based model). The program can also be a hybrid, setting both time parameters and skills benchmarks for apprentices to meet.

These overarching decisions establish the shape of an apprenticeship and create guidelines for how best to proceed with the subsequent steps.

<sup>101</sup> Ibid

## Define Occupational Standards

Once the internal foundation for a program is in place, an employer can determine the **occupational standards**. These standards will become guidelines for the training and progression elements of the apprenticeship.

The process may vary depending on how an employer approaches its apprenticeship. In an in-house program, an employer will be responsible for creating occupational standards; in an intermediary-led apprenticeship, a third party may do so.

Regardless, a sponsor's first step is identifying what position an apprentice will fill and determining whether an **occupational code** for that role exists. An occupational code is a standardized definition of a specific job, set by the **Occupational Information Network (O\*NET)**.<sup>102</sup> Sponsors of an unregistered program can use occupational codes as guidelines but are not required to follow them to start a program.

If an occupational code does not exist, one will need to be created, which can take up to 12 weeks and can be accomplished with the help of a DOL representative.

If an occupational code does exist, the sponsor should determine whether the role is already among the "List of Apprenticeable Roles"<sup>103</sup> determined by the DOL. If a role is listed as apprenticeable, then DOL approved standards are already in place and the employer can move on to designing a program framework

If a role is not listed as apprenticeable, then industry vetting of the position must take place to develop applicable standards. To complete that process, the DOL Office of Apprenticeship will send a questionnaire to nine companies, unions or other recognized associations within an industry to gather input before determining industry standards for a position.

<sup>102</sup> <https://www.onetcenter.org/overview.html>

<sup>103</sup> <https://www.doleta.gov/oa/occupations.cfm>

## O\*NET

**A wide range of tech careers can be found in the Occupational Information Network (O\*NET) with related occupational codes, including:**

- Computer Systems Analyst
- Computer Systems Engineers/Architects
- Database Architect
- Information Technology Project Manager
- Software Developers, Applications
- Web Administrator
- Web Developer

With the occupational code in hand, the employer can move on to developing a competency framework for its apprenticeship. According to IBM's playbook on apprenticeship, a **competency framework** is "a tool used to outline the work process schedule, required competencies, evidence types and assessment criteria used to evaluate an apprentice's overall progress." This will determine the markers an apprentice will be expected to hit to be considered successful.

Developing a framework includes working with subject matter experts to create guidelines that address what an apprentice will be expected to learn, what training will be used to teach necessary skills and how to evaluate whether those standards are being met. Employers can also consult existing work process schedules and O\*NET as resources to help develop a competency framework.

## Set Program Standards

Once the broad strokes of a program are complete and a competency framework is in place, business leaders can start developing **program standards**. Program standards will form the overarching plan for how an apprentice progresses through a registered program. Like occupational standards, program standards are not required for an unregistered apprenticeship but can be a useful tool for a sponsor.

Program standards should specify the role that will be filled by an apprentice, clearly define what form — competency- or time-based — the apprenticeship will take and set training guidelines. Apprentice pay and progressive wage growth can also be outlined in program standards to build in concrete rewards for apprentices as they progress.<sup>104</sup>

These standards will vary depending on whether a company chooses to build an in-house program, hire an intermediary or operate as part of a state-run apprenticeship. If an intermediary is taking on the sponsorship role, for example, it will handle this step. Or, if the apprentice will be hired as part of a state-run program, standards may already exist as part of that program.

Program standards should go through several rounds of review among business leaders and others within the company to ensure the result is a strong foundation on which to launch a program.

## Register the Program

Throughout this process, employers can turn to representatives at national or state apprenticeship offices for help and guidance if they plan to register their apprenticeship. It is important to first determine whether to register an apprenticeship as a national apprenticeship with the DOL or state-level program with an SAA where applicable.

Registering an apprenticeship as a national-level program can be more efficient if it will cross state lines, eliminating the need to register the same apprenticeship more than once. (Note that in California, even if a program will be federally registered, a sponsor must develop and register a separate set of state standards.) National registration opens access to some federal funding to offset training costs, although those funds cannot be used to pay apprentices' wages.

If a program will operate in only one state with an SAA, the employer should register the apprenticeship at the state level. In some states, a program can be dually registered with an SAA and the DOL, although others – including New York – don't have reciprocity with federal government and don't allow dual registration. Federal funding is not necessarily tied to registering an apprenticeship program with the DOL.

In states without an SAA, sponsors will need to register their programs with the DOL with the help of a regional representative, even if the apprenticeship will take place only in that state.

<sup>104</sup> [https://doleta.gov/oa/employers/apprenticeship\\_toolkit.pdf](https://doleta.gov/oa/employers/apprenticeship_toolkit.pdf)

## Select Related Technical Instruction

Determining how to deliver RTI is a critical step in designing an apprenticeship. Employers can choose to offer training in-person or online, opt to work with a free or subscription-based vendor or find a partner or community college that provides a certificate upon completion.<sup>105</sup>

Business leaders should evaluate what local resources are available to find partners — like educational institutions — that may meet their needs. Some companies may pursue online training options like those offered by an intermediary such as Onramp, a virtual IT bootcamp or other alternatives.

Employers should consider various factors when selecting RTI such as:

- Will there be a need for more than one vendor to meet all training needs?
- How will training be tracked during the RTI process?
- Does the vendor offer a direct path to certification?

After addressing these questions, the employer can select an RTI provider best suited to its needs.

Once an RTI provider is chosen, the next step is to plan the apprentices' curriculum. This can happen with the help of the provider — which may have a curriculum in place — or can be developed from scratch to meet program needs.<sup>106</sup> The latter comes with associated costs and additional administrative requirements to maintain, but offers a greater degree of control. At this point, sponsors will rely on the competency framework they developed to ensure the RTI covers all the necessary milestones.

## Recruit and Select Candidates

Recruiting and selecting apprentices is critical to any program. Success at this stage is driven by relationships between the employer and other members of the apprenticeship ecosystem.

The first step in recruitment and selection is to develop a strategy to attract apprentices. Coordinating with community colleges, for example, offers employers a source for potential talent and can connect the employer to other partners within the ecosystem. Employers can also turn to workforce development organizations and technical bootcamps to market their program and attract applicants.<sup>107</sup>

An employer should also shape a selection process. During the selection process, it is important to tailor interview questions and other selection criteria to attract applicants without advanced degrees or work experience. At the same time, questions should be designed to find applicants that have the requisite aptitude, attitude and growth potential to succeed.

Employers can use traditional screening methods, such as interviews, but should add other tools, including skills assessments or mock project development.<sup>108</sup>

<sup>105</sup> [https://www.illinoisworknet.com/DownloadPrint/Chicago-ApprenticeNetwork\\_BridgingtheGap\\_Digital\\_Final.pdf](https://www.illinoisworknet.com/DownloadPrint/Chicago-ApprenticeNetwork_BridgingtheGap_Digital_Final.pdf)

<sup>106</sup> Ibid

<sup>107</sup> Ibid

<sup>108</sup> Ibid

## Create a Positive Apprenticeship Experience

With an apprenticeship underway, an employer should monitor the program to ensure it operates effectively as planned. There are, however, some constants that can be applied in any case. Managers, mentors and apprentices should all be considered when evaluating the program, for example. Each is a key stakeholder of an apprenticeship, and each of their concerns or comments should be heard.

The employer should create a specific onboarding process to guarantee that every apprentice is offered the same starting point from which to grow and create opportunities for engagement and a sense of belonging.

Developing a schedule for regular check-ins and to garner feedback helps build a strong experience. Creating a space — physical or virtual — to encourage collaboration and communication among apprentices within a cohort can also be helpful.

The overall program and the apprentice experience should be considered a living, iterative process. The program will benefit from ongoing refinements and feedback to meet to the individual needs of an employer and its apprentices.

## Evaluate Funding Opportunities

In addition to the operational and administrative support available to sponsors from government agencies, financial assistance is available to employers running registered apprenticeships. These funds are designed to encourage the development and expansion of apprenticeships and create more pathways to well-paid careers for workers.

By registering as a sponsor, an employer or intermediary may access funding to help offset some costs of training and other elements of an apprenticeship. A sponsor is required to pay each apprentice's wages, and may not use grant money or other taxpayer-funded resources for that purpose.

Funding opportunities for apprenticeship sponsors are varied: federal grants<sup>109</sup> and other forms of assistance are available through the DOL.<sup>110</sup> SAAs offer their own sources of funding, and other partners within the apprenticeship ecosystem — such as a labor group — may be able to help an employer find funds. In addition, some tax credits<sup>111</sup> may be available to employers.

In June 2019, for example, the DOL expanded the federal funds available to apprenticeship operators with \$183.8 million “Scaling Apprenticeship Funding” to expand apprenticeships through public-private partnerships between educational institutions and industry associations, individual employers or other private partners.<sup>112</sup> In total, 23 institutions received grants funded by H-1B visa fees, to build out their apprenticeship efforts.<sup>113</sup>

<sup>109</sup> <https://www.dol.gov/featured/apprenticeship/grants>

<sup>110</sup> <https://www.doleta.gov/oa/federalresources/playbook.pdf>

<sup>111</sup> <https://www.doleta.gov/oa/taxcredits.cfm>

<sup>112</sup> <https://www.dol.gov/newsroom/releases/eta/eta20190624>

<sup>113</sup> Ibid

The DOL approved another \$100 million to expand apprenticeships generally<sup>114</sup> by funding as many as 30 apprenticeship grants ranging from \$500,000 to \$6 million.<sup>115</sup>

These and other financial incentives are widely available to apprenticeship sponsors. Many operate through public-private partnerships often formed between government agencies, educational institutions, and/or industry partners. Incentive programs often have rolling application periods and

prompt response times to make them flexible enough to meet business needs as quickly as possible.

Employers have the option to use available funding, but it is not required to run an apprenticeship. Employers who choose to make use of state or federal funds should apply to government solicitations as they are announced. For example, some of the funding solicitations and grants awarded as of September 2019 include:

## Federal Funding Resources

### [Scaling Apprenticeship Through Sector Based Strategies](#)

July 2018: \$183 million from the U.S. Department of Labor.

### [Expanding Community College Apprenticeships Initiative \(ECCA\)](#)

June 2019: \$20 million in funding awarded to AACC as a part of a cooperative agreement with the U.S. Department of Labor.

### [Apprenticeships: Closing the Skills Gap](#)

July 2019: \$100 million from the U.S. Department of Labor.

### [ApprenticeshipUSA](#)

July 2016: \$90 million from the U.S. Department of Labor.

### [Technology Modernization to Scale Apprenticeship and Pre-Apprenticeship](#)

Summer 2018: \$16.3 million from the U.S. Department of Labor.

### [Women in Apprenticeship and Nontraditional Occupations \(“WANTO”\) Technical Assistance Grant Program](#)

August 2019: \$1.5 million from the U.S. Department of Labor.

### [Advancing Youth Apprenticeships](#)

July 2019: \$10.5 million to The Urban Institute from the U.S. Department of Labor.

## State Funding Resources

### [State Apprenticeship Expansion Grants](#)

Spring 2018: \$50 million from the U.S. Department of Labor.

### [USDOL Training and Employment Guidance Letter \(TEGL 17 18\)](#)

May 2019: \$73 million.

### [California Apprenticeship Initiative \(CAI\) Grant Program](#)

July 2019: \$10 million from the California Community College Chancellor’s Office.

### [California Employment Training Panel \(ETP\) Investments in Apprenticeship](#)

March 2012: the ETP invests several million dollars annually.

### [Louisiana Workforce Commission \(LWC\)](#)

June 2018: \$1.27 million from U.S. Department of Labor.

### [Texas Workforce Commission](#)

Funds available for local public educational institutions to support the costs of related classroom instruction in registered apprenticeship training programs.

<sup>114</sup> Ibid

<sup>115</sup> Ibid

# VI. Conclusion

In industries as diverse as e-commerce, music streaming and advanced manufacturing, business leaders now recognize the power of apprenticeships. When companies adopt apprenticeship models, they build diverse workforces that can adapt to tech-centric challenges and meet 21st century hiring demands.

To remain competitive in an economy where every company has become — whether in name or not — a tech company, executives must find ways to train many different types of workers, both in the classroom and on the job.

Companies can tailor programs to a wide range of industry, company and employee-specific needs. They can adapt their training practices to meet the latest certification requirements and equip workers with exactly the skills they'll need to be successful on the job.

Whether a company has a well-established workforce spread around the globe or a small team working closely together, the need is the same: well-trained workers ready to rise to the responsibilities of new collar jobs.

Business leaders should reach for apprenticeships as a fundamental tool to meet that demand.

This white paper offers a starting point for industry leaders ready to add apprenticeships to their toolkit and demonstrates the wide-ranging applicability of apprenticeships regardless of size, sector or hiring needs.

By committing to create apprentice opportunities, employers will help close the skills gap and build stronger, more diverse and adaptable workforces.

# VII. Glossary

**Apprenticeship:** An industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience, classroom instruction and a portable, industry-recognized credential.

**Compensation:** One of the required elements of an apprenticeship. Apprentices are compensated as soon as they begin training or working and receive wage increases as they reach learning milestones.

**Competency framework:** A tool used to outline the work process schedule, required competencies, evidence types and assessment criteria used to evaluate an apprentice's overall progress.

**Eligible Training Provider Lists:** Lists of training providers that meet requirements to receive Workforce Innovation and Opportunity Act (WIOA) funds.

**Federal registered apprenticeships:** Apprenticeships registered with the DOL. These programs meet the standards and guidelines set by the DOL, which oversees program credentials and occupational standards, apprenticeship safety, certification and other program elements.

**Industry-Recognized Apprenticeship Program (IRAP):** An industry-led approach to apprenticeships currently under review by the DOL. Under the IRAP model, as currently proposed, a Standards Recognition Entity authorized by the DOL would be allowed to approve apprenticeships with industry-specific standards.

**Industry recognized credential:** A portable credential earned upon completion of a registered apprenticeship that signifies to employers that an apprentice is qualified for the position in which he or she trained.

**Intermediary:** An organization with the capacity, expertise and network to help employers successfully create, launch and expand apprenticeships.

**Mentorship:** One of the required elements of an apprenticeship. Mentors guide apprentices through the transition into a company's workforce, provide face-to-face training to help apprentices grow into their new roles and give apprentices someone to whom they can ask questions.

**National Apprenticeship Act:** A law passed in 1937 that established a national committee to set safety and welfare standards for apprenticeships. Later amendments shifted that responsibility to the DOL, allowing the department to regulate programs.

**New collar job:** A job requiring specialized technical and soft skills to work in new and emerging roles, but which does not require a four-year degree. Ginni Rometty, CEO, IBM, coined the term.

**Occupational code:** A standardized definition of a specific job set by the Occupational Information Network.

**Occupational Information Network (O\*NET):** A DOL-sponsored program that includes a database of standardized, occupation-specific definitions of jobs throughout the U.S. economy.

**Occupational standards:** Standards submitted as part of an application for a registered apprenticeship that define elements of a program, including job descriptions, wage schedules and competency frameworks.

**On-the-job training (OJT):** Hands-on training for apprentices in the workplace. On-the-job training includes instruction in the skills and knowledge the apprentice needs to be successful in his or her position.

# Glossary (cont.)

**Program standards:** Written terms and conditions for the qualification, recruitment, selection, employment, training and supervision set forth by the sponsor.

**Related technical instruction (RTI):** Education that teaches technical skills necessary to complete the duties of an apprenticeship either online or in a classroom setting.

**Sponsor:** An employer, group, educational institution or other entity responsible for the overall operation and administration of an apprenticeship.

**State Apprenticeship Agency (SAA):** Agencies in 25 states and the District of Columbia authorized by the DOL to oversee apprenticeships in their state. Once authorized, SAAs can process applications for new programs, issue credentials and carry out other duties on behalf of the DOL.

**State registered apprenticeships:** Apprenticeships registered with a State Apprenticeship Agency (SAA). These apprenticeships meet a set of state-specific standards and can operate only in the state in which they are registered.

**Unregistered apprenticeships:** Apprenticeships not registered with either the DOL or an SAA that do not have to meet the same quality standards as registered programs.

**Workforce Innovation and Opportunity Act (WIOA):** A law passed in 2014 to replace the Workforce Investment Act of 1998. The WIOA includes an emphasis on apprenticeships as a way to adapt worker training to meet the needs of a changing economy, puts apprenticeship representatives on state and local workforce boards, and places registered apprenticeships on Eligible Training Provider Lists.

# About the Consumer Technology Association

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As North America's largest technology trade association, CTA® is the tech sector. Our members are the world's leading innovators — from startups to global brands — helping support more than 18 million American jobs. CTA owns and produces CES®, the largest, most influential tech event on the planet. Find us at [CTA.tech](http://CTA.tech) and follow us @CTAtech.

**Consumer  
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## About the CTA Apprenticeship Coalition

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CTA® and IBM created the CTA Apprenticeship Coalition, a collaborative effort by CTA member companies to create and expand hundreds of apprenticeship opportunities in the tech industry nationwide. Coalition members commit to learning about and offering apprenticeships at their companies. Learn more at [CTA.tech/apprenticeship](http://CTA.tech/apprenticeship) or write us at [JBlack@CTA.tech](mailto:JBlack@CTA.tech) to learn more.

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